TROPICAL DISEASES BUREAU.

SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN.

APPLIED HYGIENE IN THE TROPICS.

By Lt.-Colonel W. Wesley Clemesha, C.I.E., I.M.S. (retd.).

Supplement No. 3.] 1924. [October 30.

DISEASE PREVENTION.

McKinlay (R.). **A Brief History of the Interallied Sanitary Commissions in Turkey, abstracted from the Annual Report of the Sanitary Commissioner, Constantinople, for the Year 1922.**—*Jl. Roy. Army Med. Corps.* 1924. May. Vol. 42. No. 5. pp. 359–373.

This paper deals with the experience of the Allied Sanitary Commission in Constantinople during the occupation of the allied troops. As usual where an army goes, sanitation comes in for a general overhaul. The old arrangement of partly Municipal and partly Governmental sanitary control, both of which departments were completely bankrupt, had to be replaced by something more active; consequently the existing organization was strengthened by an Inter-allied Sanitary Commission which took over such matters as street cleaning, municipal hospitals, attendance of the poor, public vaccination, burial services, investigations of shops and bakeries, etc., and infectious diseases except plague, cholera, typhus and relapsing fever, which came under the department of "Service de Santé Publique Ottomane."

The sanitation of Constantinople itself left much to be desired. The drainage system was crude and entirely inadequate; a great deal of the sewage soaked straight into the ground though drains of an altogether dilapidated and unsystematic nature existed.

The water supply is derived from three sources. The Derkos supply comes from Lake Derkos, some 20 miles distant from the town; the water is unfiltered. The Evkaf supply originated in a series of artificial reservoirs in Belgrade Forest and the reservoirs and conduits were in a deplorable state of disrepair. It was possible to find coli bacteria present in 0·5 cubic centimetres in both supplies.

Wells exist all over the town, and the quality of the water from these may easily be imagined.

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Naturally the writer very much dreaded the importation of cholera ; every possible protection was taken against it in refugees. The faeces of every person on arrival at the port was examined in the laboratory. Up to the end of September 11,179 such examinations had been carried out, with the result that 17 cholera carriers and 10 carriers of a non-agglutinating vibrio were isolated. This entailed a great deal of work and a certain amount of inconvenience to the people. Nobody was allowed to proceed until pronounced non-infective ; 18,018 cholera inoculations were carried out ; 23 cases of the disease were actually removed from ships in the harbour. 29 cases of plague with 10 deaths occurred. Examination of 200 rats showed that none was infected, though the writer considers that in parts of the town the rodents were probably suffering from the disease ; 107,676 inoculations were carried out. As regards typhus, at no time during the year did it assume alarming proportions ; 4·5 cases per week was the average, with a maximum of 22. Considering the overcrowded conditions of the town and the semi-starving and filthy condition of the refugees, this must be considered satisfactory. A small amount of relapsing fever and 704 cases of smallpox occurred. Enteric was very prevalent ; during July to October 840 cases occurred, and the writer is of the opinion that there were actually many more. Whether it was water borne or fly borne has never been definitely settled ; 86,154 persons were protected by inoculation.

No less than 360,000 refugees came into Constantinople from the Crimea in 1919. During the Greek offensive in 1921 65,000 Greek and Turkish refugees arrived; in February 1922 20,000 Armenians, and as a result of the Turkish victories in the latter months of 1922, another 100,000. It is easier to imagine than describe the condition of the sanitary arrangements. The author remembers a ship of 1,500 tons which had on board 4,500 Greek refugees (her normal complement of passengers would be about 60) ; 27 cases of relapsing fever, 2 of smallpox, 7 of cholera, besides many other non-infectious cases, were taken off this boat alone. While it was lying in the Bosphorus 41 deaths occurred, and the writer was informed that before disembarkation at a Greek Island there were 800 more.

8,000 to 9,000 dogs were destroyed in the city, as rabies was fairly common ; a Pasteur Institute was established ; 1,709 people made use of it in the first year and 899 were actually treated for rabies.

" The director of the institute lays stress on the fact that all authorities appear to agree that although birds can be inoculated with rabies, they never show any clinical symptoms. He illustrates this by the case of a child who was bitten on the face by a cock and who was brought to him by the parents, who wished to know whether or not treatment was necessary. He inoculated a rabbit from the brain of the bird and the rabbit died of rabies on the ninth day."

PROCEEDINGS OF THE ASSAM BRANCH OF THE BRITISH MEDICAL ASSOCIATION. **Annual Meeting, Jorhaut, 16th & 17th February 1924.**—49 pp.

The Assam Branch of the British Medical Association seems to be an extraordinarily flourishing and virile off-shoot from the parent stem. The proceedings of their yearly gathering are always of very great interest and the papers read excellent. This year is no exception to the rule.

Two members of the staff of the Calcutta college, namely, Major SHORTT and Major ACTON, read papers, the former on the "Present position as regards the problem of transmission of kala azar," and the latter "Some recent advances in the diagnosis and treatment of the commoner tropical disease." The former of these we do not propose to notice, because it will be reviewed elsewhere.

The latter gives some extremely useful advice on such commonplace diseases as dysentery, ankylostomiasis, etc. He writes:—

"Dr. MacVail of our School has conducted a useful piece of work on the fertility of the female hookworm. By this work he is now able to tell us when mass treatment should be employed, *i.e.*, before the monsoon.

"Dr. MacVail tested the relative values of chenopodium and CCl_4, and his results may be briefly summarised as follows:—CCl_4 costs Rs. 3–8 a lb. and is given in two consecutive doses of 70 minims, on each day. In all 140 minims are given to effect a cure. CCl_4 should be followed by a purge. It is a specific for hookworm and oxyuris. The disadvantages are that it should not be given to people suffering from inefficiency of the liver or to persons addicted to alcohol. There have been several cases reported amongst your coolies who suffering from the intoxication of CCl_4 complete it still further by an alcoholic bout, and suffer from toxic symptoms. This symptom of giddiness that is produced by CCl_4 is a distinct disadvantage, as it means that the men have to be off duty for 48 hours. Chenopodium, on the other hand, costs Rs. 35 a lb., and is given in 10 minim doses in capsules at intervals of an hour up to 30 minims. It is necessary to repeat the course weekly for two more doses. It is contraindicated in kala-azar, and it is a specific for anchylostomes and roundworms. The advantages are that no purge is necessary, and [only] occasionally slight symptoms are produced, so that there is no loss of labour. The disadvantages are the additional expense of the drug and that it has to be given in capsules."

Under the head of leprosy the writer makes the statement that at least 10 per cent. of the population attending the general skin department in Calcutta are suffering from leprosy, that this disease is primarily a skin disease and ought to be diagnosed with the aid of the microscope in the early stages of the disease. As a matter of fact, it is very frequently overlooked at this period.

Dr. Malcolm WATSON read a paper on his experience in antimalarial work in the Federated Malay States. He points out that the conditions in Assam and Malaya are similar in many respects; at any rate, *Anopheles maculatus* is common to both countries. A paper by Dr. FORSYTH on some "Principles of preventive medicine in Assam," and by Dr. HERMITTE on a "Discussion on the benefits of centralisation of serious sick in Tea Garden Practice," and finally an extremely interesting paper on "Chloroform administration and its dangers," by Lieut.-Col. PALMER make up the number.

ABBATUCCI. **Sur le protection de la main-d'œuvre indigène en Afrique.**—*Presse Méd.* 1924. May 31. Vol. 32. No. 44. (Supplément.) pp. 923–925. [1 ref.]

The writer points out that the population of French West Africa is extremely sparse—3 inhabitants to the square kilometre and 1 per square kilometre for French Equatorial Africa. Obviously, therefore,

it is in the interest of everybody to protect as far as possible the labourer in these Colonies. He proceeds to deal with the various arrangements of recruiting, passing the labourer on to his working centre, medical inspection required on arrival; housing accommodation is also discussed, and the ration. He quotes the one used in Belgian Congo at Katanga.

Manioc Flour ...	7,200 gm.	Vegetables or fruit	1,000 gm.
Beans	500 ,,	Fresh Meat ...	1,400 ,,
Peanuts	500 ,,	Salt	105 ,,

This ration is variable; the flour may be replaced by maize flour or rice; the beans by peas or lentils; palm oil may be substituted for peanuts, and fresh fish or dried fish for meat. The above diet is certainly liberal.

Preventive measures against ticks, mosquitoes and body lice, etc., are also described, and the more important medical organizations in the event of sickness.

BULLETIN OF THE PUBLIC HEALTH ASSOCIATION OF AUSTRALASIA. 1923. July. Vol. 1. No. 7. pp. 1 & 3. With 1 plate.—**An Interesting Public Health Movement.**

"On the opposite page is reproduced a few of the leaflets and booklets issued by the Colonial Mutual LifeAssurance Societyfor the benefit of their policy-holders. (Fig. 51.) Public Health workers who are conversant with the magnificent work done by the Metropolitan Life Assurance Company of the U.S.A. on similar lines will heartily welcome this movement on the part of the Colonial Mutual Life. We know from the experience of the Metropolitan Life what great and lasting good is done by this class of Health propaganda. . . . .

" In nine years this concern issued 187,824,532 pieces of Health Literature; gave nursing care to 1,350,192 policy-holders, and paid 6,076,583 visits to those policy-holders.

" Of course, the Colonial Mutual Life will never attain such figures—at least not for many, many years, but in proportion it is doing great and valuable work. Since the foundation of the Welfare Service Department, which deals with the work, twenty-two months ago over 500,000 pieces of literature have been issued and visits to policy-holders are being made at the rate of 5,000 per annum."

BENGAL. **Bengal Public Health Report** [BENTLEY (Charles A.), Director of Public Health], **Bengal Sanitary Board Report** [GOODE (S. W.), President], **and the Report of the Chief Engineer, Bengal Public Health Department for the Year 1922** [WILLIAMS (G. B.), Chief Engineer].—pp. iii + 66 + xxxix + 7. With 62 charts. 1924. Calcutta: Bengal Secretariat Book Depot. [Price Rs. 3-8.] [Malaria.]

" *Malaria increases after drainage and diminishes after flushing.*—It has been known for hundreds of years that the draining of swamps involves a grave risk of increasing malaria unless the work is done so thoroughly that the land will either grow dry crops or at least be fit for pasture. On the other hand, ever since Empedocles flooded the lowlands surrounding Selinos and in this way made the city healthy it has been known that swampy tracts may be freed from malaria by flushing them with an abundant supply of water.

FIG. 51.—Reproduction of some of the health literature which the Colonial Mutual Life Assurance Society, Australia, issues from time to time to industrial policyholders.

[Reproduced from the *Bulletin of the Public Health Association of Australasia.*]

" We now have definite proof of these two facts in Bengal, as may be seen by the inserted blocks [Fig. 52], which show the increase of malaria that has followed drainage in two separate localities, and on the other hand the great diminution of malaria that has occurred at Kumarkhali since the carrying out of a small scheme for the purpose of flushing out the drains, ditches and hollows in and about the town, with an abundant supply of water from the river."

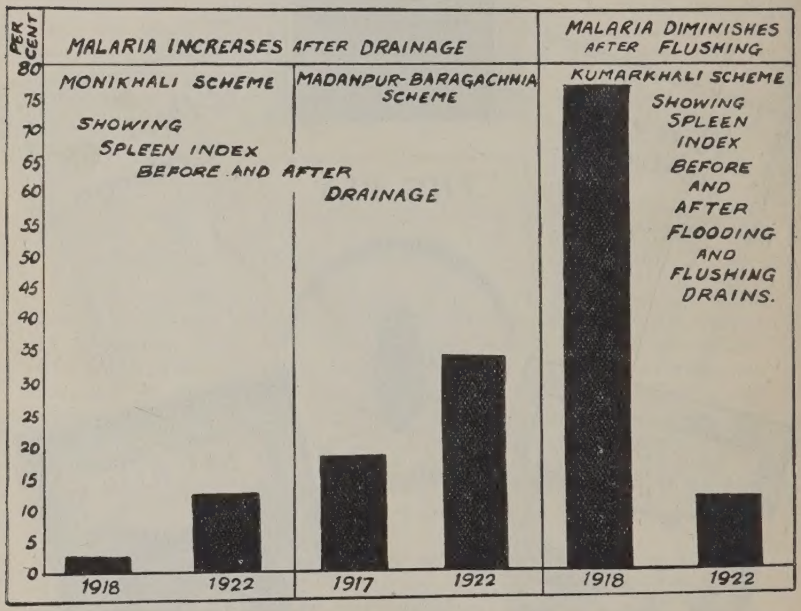

FIG. 52.—Comparison of increase in spleen index in two areas following drainage, with decrease in an area following flushing with an abundant supply of water.

[After diagrams in the *Bengal Public Health Report for 1922.*]

Malaria in the Province of Bengal shows a strong tendency to increase, and, indeed, is becoming more prevalent in places that were formerly free. The writer's explanation of this is as follows :—

" *Some causes of increased malaria.*—Probably there are many factors concerned in the increase of malaria in Bengal districts, but some of these factors can be easily recognised. For example, in the low lying swampy parts of Bengal interference with the natural flow of water across country from field to field, the obstruction or silting up of water-courses, and any condition, in fact, that seriously diminishes the supply of water and promotes stagnation, whether it be on the land surface or in the beds of streams and drainage channels, leads to a local increase of malaria. Again and again during the last 60 years the construction of embankments has produced this condition of things, and the outbreaks of epidemic fever that have resulted have been subsequently followed by a permanent increase of endemic malaria.

The inset block [Fig. 53] indicates in a diagrammatic manner the comparative frequency of embankments in the several natural divisions of the province, and if we compare it with the map showing the relative prevalence of malarial disease in the various districts, it will be seen that the eastern portion of the province, which possesses the fewest embankments, is far less malarious than all the areas to the west, where embankments of all kinds are much more numerous. *Prima facie*, it would appear, therefore, that there is good ground for the current belief that embankments conduce to malaria.

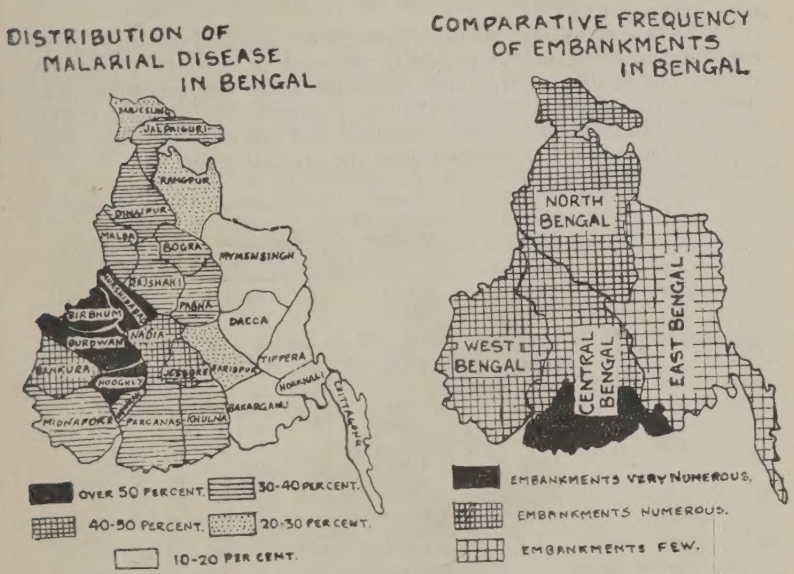

FIG. 53.—Comparison of distribution of malaria with frequency of embankments in Bengal.

[After diagrams in the *Bengal Public Health Report for 1922.*]

Embankments obviously obstruct the flow of water and tend both to diminish the supply of moisture to the areas situated below them as well as to promote general stagnation. And this result may follow the adoption of protective river embankments or the construction of embanked roads and railways. It is noticeable that epidemic malaria has now appeared in parts of Eastern Bengal where railways have been constructed in recent years."

PHILLIPS (J. A. S.). **On the Results of Anti-Malaria Measures in Five Towns in the United Provinces.**— *Indian Med. Gaz.* 1924. May & June. Vol. 59. Nos. 5 & 6. pp. 221–228. With 3 maps. pp. 273–278.

In the years 1909–14 a great deal of work was done in the study of malaria in various towns in the United Provinces by the late Lt.-Col. J. C. ROBERTSON and Lt.-Col. GRAHAM. The following towns were reported upon—Saharanpur, Basti Nagina, by Col. ROBERTSON,

Kosi, Meerut and Lucknow by Col. GRAHAM. The writer of this paper refers to the recommendations made by the officer originally reporting on the situation and discusses the improvement in health that has taken place. In most cases the recommendations have been carried out with most excellent results.

In practically every town the birth rate has gone up, the fever death rate and total death rate have gone down, and the spleen rate amongst children and the parasite rate have dropped very greatly. The results are most gratifying, and it speaks well for the care with which the original investigations were carried out and the soundness of the conclusions arrived at.

In the case of Saharanpur Col. ROBERTSON suggested the stoppage of canal irrigation at within ¾ mile of the edge of the city. This was carried out until quite recently, when the order was repealed. The writer of the article points out that the permitting of irrigation in this area is a decidedly retrograde step and will certainly do away with much of the good that resulted from the original report.

	Year.	Total number of children examined.	Number with enlarged spleens.	Percentage with enlarged spleens.
Saharanpur ...	1909	2,665	2,101	78·8
	1923	2,720	198	7·3
Nagina ...	1909	1,957	1,543	79·1
	1923	1,038	140	13·49
Kosi	1910	964	784	81·3
	1923	480	204	42·5
Meerut ...	1911	5,494	325	5·9
	1923	3,126	41	1·3

Meerut Areas.	Percentage with enlarged spleens 1911.	Percentage with enlarged spleens 1923.
A	18·9	2·4
B	10·4	1·8
C	16·4	1·4
D	4·7	0·5
E	5·8	1·2
F	7·3	Nil.
G	4·4	0·9
H	4·0	1·5
K	2·5	1·3

Parasite Rate.

	Year.	Parasite rate. Per cent.		Year.	Parasite rate. Per cent.
Saharanpur ...	1909	53·8	Kosi ...	1910	26·0
	1923	10·3		1923	6·5
Nagina ...	1909	44·4	Meerut ...	1911	6·0
	1923	6·0		1923	3·0

Lucknow. In 1913 Major GRAHAM found 2·2 per cent. of the children had enlarged spleens; in 1923 1·6 per cent. Neither Lucknow nor Meerut were originally what may be called very malarious towns as compared with the others.

SHORTT (H. E.). **The Occurrence of Malaria in a Hill Station.**—*Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 771–789. With 5 charts, 2 plates & 1 sketch map.

The author deals with the increase in the prevalence of malaria in Shillong. This station is situated about 5,000 ft. above sea level and is a health resort. Recent figures obtained by observing the blood slides sent to the Pasteur Institute show that there has been a decided increase in the number of malignant tertian infections during recent years. In 1922 the disease was more prevalent then usual.

The writer considers that the floating population at the Pasteur Institute, which is comprised of people from all parts of Assam who come for treatment after being bitten by rabid animals, is a source of infection, as many of these people are parasite bearers.

The mosquitoes found in Shillong are as follows:—*Anopheles maculatus, fuliginosus, gigas, minimus, rossii, rossii*, var. *vagus, lindesayi, sinensis, aitkenii.*

In the opinion of the author *A. maculatus* is the species which probably spreads the disease, although a number of dissections taken late in the year do not show many infected specimens. The small streams, the Um Kra and the Um Shirpi, are the main breeding places of this species; the rice fields in the neighbourhood may at times contribute their quota.

PALESTINE. **Proceedings of the Ninth Meeting of the Antimalarial Advisory Commission, 22nd May 1924.** [HERON (G. W.), Director of Health, President.] [MS. received from Dept. of Health, Jerusalem.]

These Proceedings are, as usual, extremely interesting. The passage quoted shows the work that has been done:—

"Mr. Briercliffe said that the malaria incidence throughout Palestine was lower in 1923 than in any previous year since the Occupation. In no part of the country did the disease appear in epidemic form. The nearest approach to an epidemic was an outbreak of benign tertian malaria at Hedera in June and July, which was traced by the Malaria Research Unit to a neighbouring swamp. The swamp had since been drained. Haifa was the only large town in which new infections were reported to any extent, and considerable efforts—of which Dr. Carley would speak later—were made to deal with the breeding places there.

"The low incidence in 1923 was attributable largely to the small rainfall in the preceding winter. In Jerusalem less than 20 inches fell during the season, as compared with an average annual rainfall of 26·6 in.

"In certain districts, however, and in all the towns, the diminution of malaria was chiefly due to the measures taken to deal with the disease. This was particularly the case in the Jezreel Valley, where the extensive drainage works had brought about a most striking fall in the incidence of primary malaria among the settlers.

"With regard to the routine measures carried out by the Department of Health, in spite of a reduction during the previous two years in the number of its sub-inspectors from 36 to 22, more routine work was undertaken than in any previous year.

"In the towns 933,236 inspections were made, as compared with 847,521 in 1922. In the course of these inspections Anopheles larvae were found on only 1,462 occasions, as compared with 4,301 occasions

the previous year. The diminution in the extent of Anopheles breeding had been very definite during the last few years. In 1921 the larvae were found once in every 1,400 inspections, in 1922 once in every 2,000, and in 1923 once in every 6,600. During the year 6,792 additional wells, cisterns, cesspits and other places were discovered in the towns, and at the end of the year there were 44,498 such places on record.

" 27,336 possible mosquito breeding places were made mosquito proof and 867 pumps installed on wells and cisterns. It was satisfactory to note that of the 4,690 town wells and 11,705 cisterns on record, 60 per cent. of the wells were mosquito-proof and over 30 per cent. fitted with pumps, while 36 per cent. of the cisterns were mosquito proof and 29 per cent. had pumps fitted. As the result of the greater number of wells and cisterns mosquito-proofed, the number of places to be oiled had decreased. Only 478,735 oilings were performed and 30 tons of oil mixture used, as compared with 508,222 oilings and an expenditure of 45 tons of oil in 1922.

" The work carried out in the villages amounted to about the same as that done in 1922. 13,305 visits were made to villages by the sub-inspectors and 148,251 oilings performed, as against 13,219 visits and 146,543 oilings the previous year. Of 18,928 potential breeding places on record at the end of the year 9,987 were stated to be mosquito-proof.

" During the last two or three years the Government expenditure on antimarial measures had been reduced from some £10,000 to £3,500, but the Municipalities were now assisting with the work in the towns and providing the necessary unskilled labour and oilers, and financial support for antimalarial work in Palestine was also being received from the Rockefeller Foundation and the Jewish Joint Distribution Committee of America, who maintained the Malaria Survey Section and Malaria Research Unit respectively."

It is noticed that the fitting of pumps to water supplies is one of the standard sanitary measures used in Palestine. It will be interesting to know whether these are an entire success. Experience in the tropics shows that unless they become the private property of an individual they do not last very long ; the treatment received at the hands of the public very rapidly renders them useless.

The paper by Dr. KLIGLER on the Flight of the Anopheles will be reviewed elsewhere.

STEINMETZ (H. H.) & TIEDEMAN (W. D.). [In English & Spanish.] **Del Carmen Malaria Survey. Data developed by the Co-operative Efforts of the Philippine Health Service, Pampanga Sugar Mills, and the International Health Board of the Rockefeller Foundation. Investigacion de la malaria en Del Carmen.**— *Jl. Philippine Islands Med. Assoc.* 1924. Apr. Vol. 4. No. 4. In English, pp. 142–145 ; in Spanish, pp. 164–165.

The paper gives an account of the malaria in Del Carmen. The following varieties of anopheles are found :— *A. barbirostris*, *A. sinensis*, *A. minimus* (commonly called *A. febrifer*), *A. maculatus*, *A. fuliginosus*, *A. philippinensis* and *A. rossi* (including the var. *ludlowii*).

The important fact was very early ascertained that comparatively few mosquitoes bred in sugar cane cultivations. As regards gamete carriers, the following were the percentages of persons with malaria parasites : Pabanlag 28·9 ; Prado 14·4 ; Pulungmasle 20·5 ; San José 23 ; and Tucop 39·9.

"The best figures we have to show this [high malaria incidence] are from two haciendas which maintain small hospitals under the supervision of the company surgeon. In one of these, during a period of 115 days, 175 persons had attacks of malaria and spent an aggregate of 1,301 days in the hospital. This number represented about 30 per cent. of the population, and each person averaged 7·5 days under treatment. On the other hacienda, 218 persons had one or more attacks of malaria during a period of 100 days. These persons represented approximately 33⅓ per cent. of the population, and were on sick call during this period for a total of 913 days, or an average of 4·2 days per person. . . .

"The first [suggestion] is that planters might develop contiguous areas unsuitable for cane, for food crops, thus giving their labourers something to do during the cane-growing season and making them permanent residents. The yearly importation of labour from other malarial sections is a great factor in increasing malaria incidence. The second suggestion is that cane areas be extended, leaving as little waste land as possible, since land under good cultivation is much less likely to present mosquito-breeding places. This reduction of mosquito breeding by agricultural drainage will bring the time nearer when it will be economical to control malaria by mosquito control."

HOLDEN (C. W.). **The Prevention of Malaria with a Division in the Field.**—*Jl. Roy. Army Med. Corps.* 1924. Apr. Vol. 42. No. 4. pp. 259–265.

This paper contains an account of the antimalarial measures used by the troops near Lake Doiran in Macedonia. The writer does not claim that there is anything very new about them; but from an administrative point of view they are of great importance.

The campaign included personal and antilarval or antimalarial measures. The personal campaign largely turned on:—

"1. The use of bivouac, hospital pattern and bell tent mosquito nets.

"2. Mosquito-proof dug-outs and huts.

"3. Head-nets, gloves and turn-down shorts.

"4. Mosquito repellant substances such as ointments and oils.

"5. General hygienic measures such as attention to cooking, gardening by the troops to provide fresh vegetables, amusements (we had a perfectly wonderful theatrical company and theatre).

"Protection from the sun. Reeds were cut from Lake Ardzan, thatching classes were instituted, and corrugated iron dug-outs and huts were thatched and open-air dining shelters made. The difference which this made to men living under corrugated iron roofs in the sub-tropics can be imagined."

As regards the antilarval campaign, all the usual measures were employed, including cutting of reeds, oiling, trenching, etc. It must be remembered that many of the places to be treated were actually under enemy fire; consequently the work had to be done at night. Antimalarial measures are sufficiently troublesome under ordinary circumstances; to undertake them under fire must very considerably increase the difficulty, even though it may add to the excitement. The most important discovery of the campaign and one that is not generally known is that cresol in very dilute solution is a very powerful larvicide. The following results are given in the article; they were obtained by Major MAYNE, R.A.M.C.

" One ounce of cresol in one cubic foot of water (=1 in 1,000) killed larvae within two minutes.

" One ounce of cresol in ten cubic feet of water (=1 in 10,000) killed larvae within fifteen minutes.

" One ounce of cresol in 100 cubic feet of water (=1 in 100,000) killed larvae within one hour.

" One ounce of cresol in 1,000 cubic feet of water (=1 in 1,000,000) killed larvae within four hours.

" One ounce of cresol in 10,000 cubic feet of water (=1 in 10,000,000) killed larvae within twelve hours."

The writer considers that cresol used in this way is much superior to ordinary kerosene oil. He quotes the case of a marsh, originally borrow pits on the edge of Lake Doiran, which was treated with cresol during the night by a small sanitary squad. The results were much superior to anything that could have been done with oil, as the enemy's fire prevented removal of the vegetation and all antimalarial measures had to be carried out during the hours of darkness.

Connor (M. E.). **Suggestions for developing a Campaign to control Yellow Fever.**— *Amer. Jl. Trop. Med.* 1924. May. Vol. 4. No. 3. pp. 277–307. With 8 figs.

This is a very detailed account of the administration and organization of a anti-yellow fever campaign. The writer gives his own recent experience in Merida, Mexico, but refers to other work done in Central America. Details of the organization, which is applicable to all large cities, are given in the author's own words.

" *The District Plan* is especially applicable to large cities and is in the nature of a permanent organisation. The plan of administration may be arranged as follows :—

" 1. The city is divided into districts, with one inspector and one or more assistants in each district. Or, the city may be divided into three large districts, and each district subdivided into zones, with a supervising inspector for each district.

" 2. The number of districts will depend upon the number of buildings to be inspected and upon their size and distribution.

" 3. The average sanitary inspector can visit and carefully inspect about 75 homes or apartments in the early weeks of the campaign, but as the inspector becomes proficient in his work the number of houses inspected daily will increase. It is a grave error, however, to judge the inspector's efficiency by the number of homes visited, *i.e.*, to give undue credit to him who inspects the greatest number.

" 4. The cycle of inspection for the first few months of the campaign should be definitely fixed at seven days, including Sunday and half day Saturday ; in other words, the area is covered in five and one half or six days. The central office should insist on this. The period of evolution from the egg to adult mosquito should be worked out for each community, and the cycle of inspection can be arranged accordingly. It is rarely ever under seven days, but during low temperature periods it is frequently as much as twelve days.

" 5. The inspections should start in each district on the same day and at the same hour and the cycle should terminate in all districts seven days later. It will sometimes happen that an inspector is delayed in his district, in which case additional help should be sent into that

district. The inspection cycle arranged as above is good discipline for the men and is greatly appreciated by the public, as they soon learn when to expect the inspector and thus eliminate long delays.

"6. The inspectors are under the immediate supervision of the inspector-general. The inspectors should be visited in their districts at least twice daily by the inspector-general, and he should note the time of his visit over his signature on the district inspector's daily report. The inspector-general should accompany the district inspector into a few homes to note the character of work being accomplished, and by discreet inquiries of the occupants he will sometimes hear suggestions for improving the service. The inspector-general should also adjust any minor differences that may arise between the public and the district inspector.

"7. In a large organization a revising inspector will be found to be of real service. His duties are to check the work of the district inspector, by carefully inspecting between 200 and 300 houses in each district. A plan which some directors have found of service is to detail the revising inspector with an assistant to a district for one or two days and to submit a report on the results of this inspection. The revising inspector always works independently of the district inspector.

"8. The duties of the district inspector are to inspect carefully every habitation in the area assigned to him, examining personally every receptacle used or intended for storing water. The receptacles found to contain larvae are to be treated in accordance with instructions given him by the central office. The inspection of the homes at the beginning of a campaign should include inspection of every room, as there may be flower vases and similar receptacles in which mosquitoes are breeding, and which would be passed over unless attention is called to them.

"9. Each member of the campaign personnel should carry with him an identification card signed by the proper authorities, and on this card should be quoted the law which authorizes him to enter houses. Each district inspector should carry a list of printed instructions issued by the general office outlining the methods of mosquito-proofing the different classes of water receptacles. On this same list there might be printed indications to the inspector on meeting objections of refractory persons, etc. (A copy of instructions used in Merida, Yucatan, Mexico, is given herewith.)

"10. At the close of each inspection cycle a general conference is held in which all members of the service take part. At these conferences the problems encountered in the work are reported and discussed, and suggestions for improving the service are received and acted upon. Many suggestions offered by the inspectors in the Guayaquil and Merida campaigns have proved of real worth and are in practice to-day."

Upon the subject of fish as larva eaters the following remarks are made :—

"The majority of the top-feeders belong to the minnow class of fish, of which the *Gambusia nicaraguensis* and the *Mollienesia latipinna*, Le Sueur, have given the best results. Of the bottom-feeding fish, the *Cichlosoma urophthalmus*, more generally known as the "mojarra," and the *Dormitator maculatus*, commonly known in Mexico as the 'goby,' have given excellent results. The top-feeders are more consistently successful when placed in barrels, fountains, or earthenware jars to which the sun has free access, while bottom-feeders can and do

live in the light as well as in the dark, and their preference for a position at the bottom of a container makes them less liable to accidents. There is this additional advantage, that mosquito larvae usually feed near the bottom of a container. Top-feeding fish do not as a rule continue active if forced to hunt their prey at a depth. In the Guayaquil campaign only bottom-feeders were used, but in Mexico both classes have been tried and the consensus of opinion is that the bottom-feeders are the more dependable. In an emergency, however, no distinction should be made until the crisis has been passed, when the proper fish for each class of receptacle can be used."

"The following procedure in distributing fish was successful in the Merida campaign:—

"*a.* Underground cisterns, one fish only, preferably male mojarra (bottom-feeder).

"*b.* Well, water entering from below, two or more top-minnows (top-feeders).

"*c.* Well, receiving water from the roof or patio, two or more bottom-feeders.

"*d.* Barrel, one fish only, mojarra (bottom-feeder).

"*e.* Fountain, swimming pool, earthenware jars, etc., two or more top-feeders."

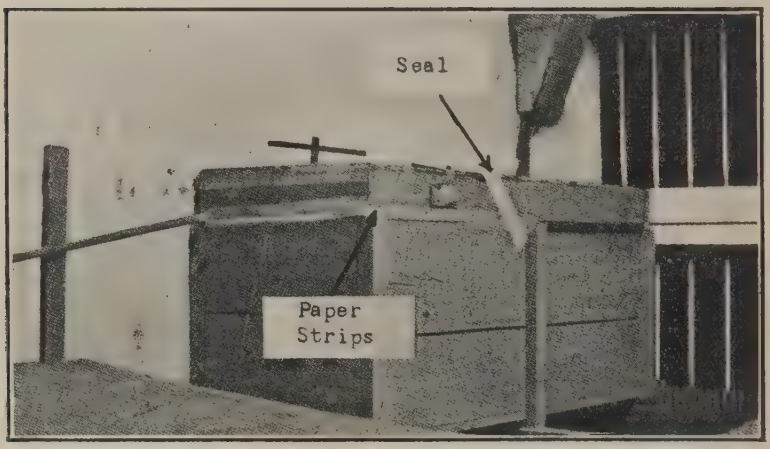

FIG. 54.—Type of interior cistern used for storing water in Guayaquil. After careful adjustment of cover to exclude mosquitoes two strips of paper, about 5 inches long by 2 inches wide, are pasted on the tank so that the cover cannot be raised without breaking the seal. On the strips of paper are printed instructions to the inspector that if the seal be found broken the receptacle is to be carefully searched for mosquito larvae, and to the occupants of the house not to remove or break the seal without written permission of the central office.

[Reproduced from the *American Journal of Tropical Medicine.*]

It is recognized, however, that the use of fish for cisterns and indoor tanks is an emergency method only. For routine purposes the mosquito-proofing of these receptacles by fitting them with properly adjusted covers of galvanized sheet iron, or good copper wire cloth, or wood is recommended. To eliminate the need for constant

inspection, these covers, after careful adjustment by the inspector, are sealed with adhesive strips (see Figs. 54 and 55) so that any tampering with the cover between the visits of the inspector may be easily detected.

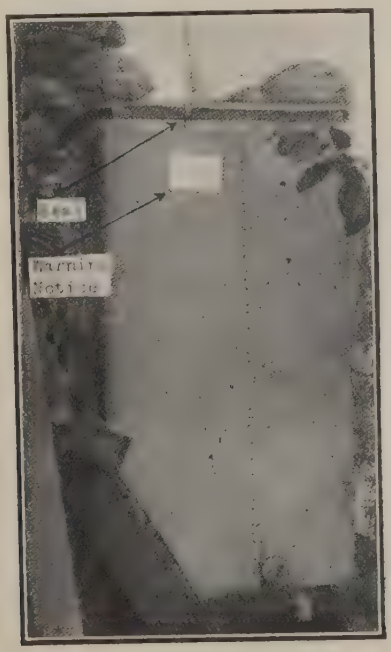

FIG. 55.—Type of water container in Merida, exposed to the elements. Here adhesive slips resistant to the fierce heat and torrential rains are used for sealing the covers. The ends of the slip are covered with a red putty and impressed conspicuously with the official seal of the Department of Health, so that the least tampering with the cover will be detected. A notice is posted on the cistern to the effect that the cover must not be moved without permit from the central office.

[Reproduced from the *American Journal of Tropical Medicine*.]

The next point dealt with is the various containers in the town of Merida. These consist of all sorts of arrangements for storing water for drinking purposes and the lye water used for softening the supply before washing clothes. It was found that if this lye water was too strong larvae would not develop in it, but when it was diluted the mixture for some unknown reason was particularly attractive to stegomyia. Various methods of overcoming the difficulties are mentioned. The use of soap in the lye-water was found to be most successful, as a little soap-suds will kill larvae.

The writer next gives an account of the well-known habits of the intimately domestic *Aëdes aegypti* (*Stegomyia fasciata*). Its breeding-places in Merida are, in order of preference, (*a*) underground cisterns, (*b*) surface cisterns or tanks, (*c*) barrels, (*d*) lye water containers, (*e*) wells, (*f*) other receptacles. Tanks on roofs of abandoned houses and

some distance from the ground appear also to be included; but puddles and rain pockets, cesspits, etc., are not commonly used.

"At the present time there are a number of Stegomyia indices in common use, *i.e.*, (*a*) density index, (*b*) deposit index, (*c*) house index, (*d*) pupae index. They may all be stated in percentages:—

"*a.* The *density index* is widely employed and is arrived at by comparing the total number of houses visited with the total number of receptacles found to contain mosquito larvae. This index gives the highest ratio of the four, as frequently two or more breeding-places will be found on the same premises.

"*b.* The *deposit index* gives the lowest ratio and is arrived at by comparing the total number of receptacles examined with the total number of breeding-places noted.

"*c.* The *house index* is the ratio of infested houses, *i.e.*, dwellings found harbouring fresh-water receptacles containing larvae, to all houses examined.

"*d.* The *pupae index* can be easily reached by comparing the total number of receptacles examined with the total number found containing pupae.

"An illustration of computing mosquito indices follows: If on a certain day 2,812 homes have been visited, and of this number 177 are found to have receptacles breeding mosquitoes, the *house index* will be 6·2 per cent. The same day there were 7,770 fresh-water receptacles examined, and of this number 258 were found containing larvae giving a *deposit index* of 3·3 per cent. The density index will be the number of houses visited (2,812) divided into the number of deposits found breeding mosquitoes (258), thus giving a percentage of 9·1. The *pupae index* will be the number of receptacles examined (7,770) divided into the number of receptacles in which pupae were noted—in this instance 129—giving a rate of 1·6 per cent. In other words, nearly 2 per cent. of all fresh-water receptacles in the area under question were liberating adult mosquitoes."

Molloy (Daniel M.). **Some Personal Experiences with Fish as Anti-mosquito Agencies in the Tropics.**— *Amer. Jl. Trop. Med.* 1924. Mar. Vol. 4. No. 2. pp. 175–194. With 6 text figs. [7 refs.]

This paper gives an account of control of malaria. It is pointed out that long before Ross's epoch-making discovery of the means of transmission of malaria intelligent people in the Southern States of America used fish to keep down the wrigglers in their tubs and artificial storage tanks. Apparently the Chinese were amongst the earliest to recognise the efficiency of gold fish, and it is suggested that probably they brought the custom into Barbadoes. The inhabitants of this island improved on the goldfish by making use of millions, and its immunity from malaria may possibly be due to this cause.

The paper then goes on to describe the work done by the author in the summer of 1915 in Nicaragua, particularly in the town of Corinto. In this campaign he used gambusia in the orthodox manner. Later, in 1919, a yellow fever epidemic broke out and a small viviparous top feeder (*Poecilia sphenops*), known locally as "olomina," was made use of. They are found all over Nicaragua in streams above tidal waters. They are very hardy, stand transport very well and are very voracious feeders. When they were first put into small water vessels they invariably jumped out, but by quietly "taming" them, that is by making the transmission from streams to small vessels through a larger tank,

in three days they got accunstomed to their surroundings. During this period the children of the house were sent frequently to the tank to accustom them to the sight of human beings. The fish were carried many miles in tins both by rail and by motor car, with a very small mortality during the journey. The writer also made use of a small perch " mojarra," as a bottom feeder for mosquitoes. In one campaign in several towns in Central America he stocked no less than 50,000 containers with approximately 300,000 fish. Malaria and yellow fever were also influenced by this campaign.

In the use of fish it is pointed out that many factors must be taken into account, the most important being the number of fish supplied and the quantity of the food supply. If the food supply is low in amount no vegetation or algae or anything else will prevent fish from hunting mosquito larvae. On the other hand, if the food supply is plentiful and the number of fish small, they will not hunt satisfactorily. Consequently in all natural sources of water it is desirable to put in a shoal of both sexes. As long as conditions are satisfactory the increase in numbers is very rapid indeed. The writer has seen these Poeciliidae travelling up streams where the ground was only just covered with seepage water in pursuit of larvae. In an estate in Grenada belonging to the Menier Chocolate Co. the irrigation channels for the cocoa plant are swarming with fish ; without this he is perfectly certain that the staff would not be able to live on account of the virulence of malaria.

HORN (A. E.). **A Simple Device for the Mosquito-Protection of Water-Tanks, Casks, etc., without the Use of Gauze.**—*Jl. Trop. Med. & Hyg.* 1924. June 16. Vol. 27. No. 12. p. 175. With 1 text fig.

A simple and ingenious apparatus is described for admitting water to a storage tank but closing automatically and keeping mosquitoes out. As the writer points out, metal gauze is frequently an entire delusion because it very soon rots through and it tends to block up and stop the flow of water altogether.

" The accompanying photograph (Fig. 56) illustrates a simple apparatus which I have designed and used in the above cases, doing away entirely with the gauze protection and proving entirely satisfactory.

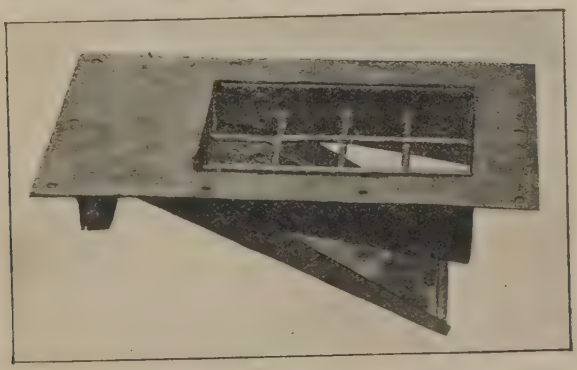

FIG. 56.—Apparatus devised by Dr. A. E. HORN for the mosquito-protection of water-tanks, casks, etc.

[Reproduced from the *Journal of Tropical Medicine and Hygiene.*]

" It consists of a thin metal plate roughly 11 in. by 8 in. in size, with an opening in it about 6 in. by 5 in. On the under surface a flange is welded around this opening 1 in. deep at one end with sides deepening to 2 in. at the opposite end. Impinging against the under surface of this flange, and fitting accurately in apposition with it when closed, is a flat metal plate, which is hinged to a wire rod immediately behind the shallow end of the flange, and with a small counterbalancing weight just sufficiently heavy to keep it comfortably apposed to the flange when at rest.

" The opening in the upper plate is guarded by a few crossed wires to prevent birds, lizards, etc., from falling unwillingly through the trap-door into the water receptacles.

" The whole apparatus is galvanized *en bloc* and so rendered rust proof. It is fixed by screws through its upper surface to the inlet in the top of the water-tank or cask, and receives the rainwater coming through the down pipe.

" While at rest it remains completely closed by the counter-balancing weight and prevents the access of mosquitoes to the enclosed water. With water falling on it the trap swings open to allow a passage, and automatically closes when the fall ceases. . . . .

" The apparatus is to be obtained from Messrs. Fredk. Braby and Co., Ltd., Galvanized Iron and Tank Manufacturers, 110, Cannon Street, E.C.4, at the following charges, which in each case include packing and delivering f.o.b. London : One only, 14s. ; one dozen, 8s. each ; one gross, 5s. each." *

ASSAM. **Annual Public Health Report of the Province of Assam for the Year 1923.** [MURISON (T. D.), Offg. Director of Public Health.] pp. ii+36+3. 1924. Shillong : Printed at the Assam Govt. Press. [Price 12 annas. 1s. 6d.]

" The recorded deaths from kala-azar in 1923 were 1,839 more than that recorded in 1922 and higher than in any year since 1905. It is noticeable that the increase has been shared by all districts without exception. In keeping with the increased mortality the number of cases of kala-azar [35,071] treated in the special dispensaries run by the Public Health Department and in the Medical Department and Local Board dispensaries, considerably increased. The proportion of deaths to the number of cases treated in 1920 was 38·8 per cent., whereas in 1923 the rate was only 11·7 per cent. This is a very remarkable improvement on the conditions which prevailed in 1920 and before."

LEAGUE OF NATIONS. **The Prevalence of Epidemic Disease and Port Health Organisation and Procedure in the Far East. Report presented to the Health Committee of the League of Nations by** F. Norman WHITE. (C.H. 130.)—179 pp. With 1 folding map. 1923. Geneva : Publication Department of League of Nations.

The League of Nations having decided that it was desirable to study the conditions of the spread of infectious diseases in ports in the Far East, a small committee of experts was appointed to visit the ports of India and of the Far East to investigate the arrangements made

* Dr. HORN writes that he has at the Colonial Office a specimen of the apparatus, which could be inspected by anyone interested in the matter.

for the prevention of communicable disease, and Dr. F. Norman White was the sole member of this committee, and he is responsible for the report which was published in 1923. Naturally the document is of considerable length, as it gives a detailed account of the procedure and conditions in a large number of ports. Those who are connected with port sanitation work should obtain copies, as the report contains a fund of information which could not be obtained elsewhere. The part with which we are most concerned is that in which an account is given of the communicable diseases that are rife in the tropics; by far the most important of these is plague. Under this head will be found a most admirable review of the whole plague situation in the East, dealing with the Manchurian outbreaks, the epidemics in Dutch East Indies, and, of course, those in India. It is certainly the best review within a short compass that has ever been produced on this subject. Naturally the main facts, or some portion of them, are known to most of our readers and need not be repeated here. The following points, however, we consider are new and may be given in the author's own words:—

Symbiosis in Causation of Pneumonic Plague Epidemics.

"A prolonged and careful study of all the available epidemiological data, only a fraction of which has been referred to here, has driven the writer to the conclusion that the plague bacillus *alone* does not, and cannot, cause widespread epidemics of pneumonic plague. It seems more than probable that there is an additional organism at work—in other words, the plague bacillus in symbiosis with another organism is responsible for epidemic manifestations of pneumonic plague, which is a disease *sui generis*. The confirmation, or refutation, of this theory must pend further laboratory investigation, opportunities for which may be afforded by the next outbreak of primary pneumonic plague. If the existence of this hypothetical organism be postulated—an organism non-pathogenic for rodents—all, or nearly all, regarding the history and epidemiology of plague that is obscure in the light of present knowledge becomes clear. In the meantime there is quite sufficient epidemiological fact to guide the framing of rules and regulations.

"It is realised that the enunciation of a somewhat revolutionary theory in a report of this nature is open to criticism, more especially as space only admits of a very incomplete discussion of a very large question. *Whether or no the theory be accepted, the few facts that are put forward in this report afford ample justification for regarding bubonic plague and pneumonic plague as two separate and distinct diseases from the point of view of sanitary conventions and prophylactic procedure.* If this be done, plague prevention can be rendered less irksome and more effective than it is at present; it will be possible to concentrate on probabilities and essentials and to neglect mere possibilities.

"It is not denied that the direct transference of infection from the sick suffering from bubonic plague to the healthy is possible *in exceptional circumstances*. The very occasional infection of the attendant on the sick must sometimes be explained in this way. Some of the small circumscribed outbreaks of pneumonic plague that have arisen during the course of bubonic plague epidemics are apparently susceptible of no other explanation, but such limited outbreaks appear to have been vastly different from epidemic pneumonic plague of more northern climates. Some of them have been circumscribed in spite of the fact that no strict measures of segregation, or any measures at all, have been applied.

"It is not contended that the plague bacillus is unessential to the development of pneumonic plague epidemics. On the contrary, it is certain that the plague bacillus is chiefly responsible for the 100 per cent. case mortality rate of such epidemics. It appears to play a rôle similar to that played by the pneumococcus during the pandemic of influenza in British India. The analogy is apposite. In certain circumstances infection with the pneumococcus is acquired by close contact with pneumonia patients. Epidemics of pneumococcus pneumonia may occur, but the pneumococcus alone is incapable of producing widespread pandemics of the influenzal type."

"*Rat-Free*" *Grain Storage.*

". . . . Rats cannot live on dry grain alone ; water is also essential. If deprived of water, *Rattus rattus* may develop those cannibalistic tendencies, of which too much has been made in certain contributions to plague literature, if they cannot escape. A very small quantity of water will supply a rat's needs—the moisture on grass or green vegetables will suffice. The first essential in the construction of a rat-free store is therefore to exclude water. The roof must be rain-proof ; all openings must be protected from driving rain by roof projections, and nothing other than dry grain must be kept in the store.

"*Rattus rattus* cannot jump as high as three feet in a vertical direction, and though an admirable climber, it cannot circumvent a horizontal projection, smooth on the under-side, if such projection be nine inches in width.

"No part of a building used as a large grain-store should in any circumstances be used for human habitation.

"In these three short paragraphs are compressed all the desiderata necessary for the construction of a rat-free store. Such a store would be built on a plinth three feet high, constructed of material impermeable to a rat's burrowing. This plinth would be surmounted on all sides by a projecting ledge nine inches wide, smooth on the under-surface. On the side containing the entrance this ledge could conveniently be expanded to two and a half or three feet to facilitate the transference of sacks of grain from or to railway wagon, bullock cart, lorry or the coolie's back. No steps or similar easy means of ingress or egress would be permitted. The roof would be raintight and project sufficiently to protect the ledge and platform from driving rain. No trees would overhang the store. Into such a store rats would be introduced from time to time. They would have to leave in search of water and they would find their return impossible.

"These ideas have been propounded by the writer on many occasions ; such godowns have been constructed. The subject is summarised once more in this place because of the conviction that the suggestions will prove of use and interest to many in the East who are grappling with a health problem of international importance, as well as one of great local concern. . . .

"Notwithstanding all these circumstances [presence and persistence of plague ; large grain export] Karachi stands alone among the large ports of India inasmuch as, to the best of the writer's belief, it has never been accused of exporting plague infection overseas, though complaints regarding other ports, *e.g.*, Bombay, Rangoon, and Calcutta, have not been infrequent in the past. The explanation of this anomalous state of affairs is simple. It is the local trade custom to ship all wheat from Karachi in new gunny bags. The wheat is emptied out of the

bags in which it has made its journey from the Punjab on to concrete platforms, where one can at times see huge mounds of grain. The wheat is there rebagged and placed immediately on board ship. This procedure was not prompted in any way by considerations of public health, but it would be difficult to devise more simple or more effective anti-plague measures. Unfortunately climatic conditions and questions of space make it impossible to introduce anything of the kind in other important plague-infected Eastern ports."

Conclusions.

"1. Bubonic plague is, all things considered, the most important ship-borne disease in the Orient.

"2. Bubonic plague is essentially a disease of rats, and the human case is, for all practical purposes, not infectious.

"3. There is abundant epidemiological information, based on a quarter of a century's experience, to justify the consideration of bubonic plague and pneumonic plague as two entirely separate and distinct epidemic diseases.

"4. It is extremely doubtful whether the plague bacillus *alone* can give rise to pneumonic plague epidemics.

"5. Epidemiological facts indicate the probability that pneumonic plague epidemics are caused by the plague bacillus in symbiosis with another organism.

"6. It is probable that this 'hypothetical' organism will be found to be non-pathogenic for rodents.

"7. Bubonic plague is invariably spread from port to port by means of 'rat-favoured' merchandise.

"8. The fact that one is able to incriminate such merchandise in the transference of plague infection from place to place implies the relative failure of the human being and his personal effects as vectors of infection.

"9. All anti-plague regulations and conventions should be framed with due regard to these facts.

"10. Of all forms of rat-favoured merchandise, grain is of chief importance with regard to the facilities given for the transference of plague infection.

"11. The control of the grain trade and the proper storage of grain are almost synonymous with efficient plague preventive measures.

"12. If the association between rats and grain and other rat-favoured merchandise could be broken in the ports of the East, plague would cease to be a ship-borne disease.

"13. If due consideration be given to the attributes of the rat, it is possible to erect storehouses that can be kept automatically rat-free. Many 'rat-proof' stores now in existence harbour a large rat population.

"14. Much more might be done than is done at present to control the rat population of such rat-proof stores; certain suggestions are contained in the note.

"15. The present condition of grain storage in many ports of the East is reprehensible and dangerous.

" 16. Pending improvement in such matters, fumigation at periodic and frequent intervals of ships trading in the East will continue to be a matter of extreme importance.

" 17. Further work is required to devise more satisfactory methods of fumigation than those at present in use.

" 18. The disinfestation before shipment of rat-favoured merchandise from plague-infected localities demands much more consideration than it receives. Such measures should, wherever possible, be taken at the port of departure.

" 19. The rat-infestation of lighters, barges, etc., employed in Oriental ports is sometimes excessive. Cases of plague among the floating population of certain ports occur from time to time. The periodic fumigation of lighters, junks, barges, etc., employed in all Oriental ports is an important matter that rarely receives the attention it deserves.

" 20. The history of the spread of plague in the East indicates that attention paid to the usual channels of infection could secure almost absolute immunity from plague, and that without vexatious restrictions to the free flow of commerce.

" 21. The tendency of the disease to die out in large areas of the East, unless reinforced by repeated introduction of infection, accentuates the importance of preventing such re-infection.

" 22. From the epidemiological viewpoint, human bubonic plague cases are merely an index of a co-existent rat epizootic.

" 23. This index is inadequate, or may fail altogether, in circumstances dependent upon either :

(1) the nature of the rat-infestation of the port, or

(2) the species of fleas that infest the rats.

" 24. Such facts emphasize the absolute necessity for a systematic and thorough routine examination of rats in all Oriental ports.

" 25. British India is by far the most important reservoir of plague infection in the East. Java comes second. The prevalence of the disease in British India is decreasing noticeably in those provinces that have suffered most.

" 26. The experiences of Manila, Formosa and Shanghai, which have been plague-free for many years, promise a successful issue to a serious attempt to eradicate plague infection from many other Oriental ports at present infected.

" 27. This task might not be insuperably difficult, except perhaps in the case of Bombay, which, of all large ports in the East, possesses conditions most favourable to plague.

" 28. The gradual extinction of foci of plague would, by diminishing sources of possible re-infection, accelerate the natural tendencies to ' die out ' which characterize plague on either side of the Bay of Bengal and further east.

" 29. In most Oriental towns anti-plague measures are unsuccessful, largely on account of the antagonism of the population to such measures.

" 30. The disinfection of houses and their contents is the most commonly practised of all anti-plague measures ; it excites great antagonism and, as carried out, is of extremely doubtful utility.

" 31. Suggestions are made regarding a new orientation of plague policy in many Oriental towns."

JORGE (Ricardo). **Sur la peste pneumonique à propos de l'épidémie d'Alcochète.**—*Bull. Office Internat. d'Hyg. Publique.* 1923. Nov. Vol. 15. No. 11. pp. 1431–1439. With 1 fig. [1 ref.]

The writer gives an interesting account of a small but very violent outbreak of pneumonic plague in a small town called Alcochète, 25 kilometres from Lisbon, with a population of about 3,000. The first case was infected in Lisbon, arrived home feeling ill, and passed the disease on to his father, brother and fiancée. The symptoms were those always associated with the disease. The second group of cases originated with the sick nurse who attended the infected family, and she passed on the disease to four other people. There were eight deaths in all, spread over a period of about a month. Previous outbreaks in Lisbon have shown that amongst 112 cases in 1920 there were only four pneumonic.

OTTEN (L.). **The Plague in Java (1911-1923).**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1924. Pt. 2. pp. 115–248. With 2 maps, 6 charts & 18 figs. [10 refs.]

The writer gives a very long and detailed account of the onset and extent of the epidemic of plague in Java. In several of the Sanitation Supplements the subject of plague measures, particularly rendering native houses free from rats, has been treated. The report under review deals with the results obtained from this and other measures. It is not very cheerful reading, but it explains in detail the cause of the non-success of very carefully organized campaigns that have been attempted in Java. Investigation into the rat and rat-flea fauna gave the following results.

" The most common species of rats found in Java are :

" (1). *Mus rattus*, sub-species : *griseiventer* BONHOTE, the common domestic rat ;

" (2). *Mus rattus* sub-species : *diardii* JENTINK, the field rat ;

" (3). *Mus rattus* sub-species : *rufescens* BONHOTE, the tree rat ;

" (4). *Mus concolor* BLYTH, the so-called small domestic rat ;

" (5). *Mus norvegicus* ERXL.=*Mus decumanus*, the sewer rat.

" Besides these species, which partly live in houses and partly in more or less close contact with houses and compounds, some other kinds deserve to be mentioned, which are less frequently or even seldom met with in dwellings. These kinds are :—

" (6). *Mus jerdoni* BLYTH, a coconut rat ;

" (7). *Chiropodomys gliroïdes* BLYTH, a graceful little bamboo rat ;

" (8). *Nesokia setifera* HORSF. ;

and moreover *Mus musculus*, the ordinary mouse, and different kinds of *Crocidura*, among which *coerulea* (*murina*), the so-called shrew, a mole-like animal, belonging to the family of the *Insectivora*.

"The generally occurring rat flea is *Xenopsylla cheopis*, the common tropical rat flea; a second species of flea being found in mountain territory, viz.: the *Pygiopsylla ahalae* . . . . . .

"In Java, where a lower temperature and a greater humidity are the cause of the far less obvious character of the 'seasonal prevalence,' a longer duration of infectiousness than the 15 days observed at Bombay might be expected from the outset. SWELLENGREBEL, moreover, in a number of experimental transmissions at an average temperature and a relative humidity of 23°C. resp. 75–80 per cent. was able to establish the infectiousness of *X. cheopis* up to 28 days. At Soerabaja, with an average temperature of 28.5°C. and a relative humidity of 64–67 per cent. he found the maximum period to be 19 days. At Kediri, HOESEN, at a somewhat lower temperature (25–26°C.) and about the same degree of humidity, observed a duration of infectiousness of 29–33 days; while VAN STEENIS at Solo in a temperature similar to that at Soerabaja and a higher relative humidity (75 per cent.) found the maximum to be 21 days.

"At Malang as well as at Kediri the maximum of 28 and 33 days was reached during the dry season; although the temperature within certain limits of humidity has evidently a preponderating influence on the period of infectiousness, we might presume that a higher degree of humidity could only prove favourable to this period. In three transmissions, made at Malang during the rainy season with three different kinds of rats (*M.r. griseiventer*, *M.r. diardii* and *M. concolor*), the breeding cages actually proved infectious during a longer period, these not being exhausted before 36, 37 and 43 days. The record of 43 days (more than six weeks) was reached in a cage with *M. concolor* as indicator, but from the fact that the domestic rat and the field rat were still liable to infection after five weeks, we may conclude the susceptibility of these three species to differ little, as is also evident from direct infection by inoculation."

As we have reported before, *M.r. griseïventer* is pre-eminently a house rat, living in the thatch and in the bamboo fabric; it often gnaws through a bamboo and makes its nest in the hollow internode.

Rattus concolor is a very active rat and a great traveller. It is a field rat in the hilly districts of the Island. It will live in houses equally well provided *M.r. griseïventer* has either been driven out by anti-plague measure or killed off by plague itself.

"The above investigations not only confirmed the supposition that *M. concolor* is met with out of doors, but moreover that in a plague-free area it occurs exclusively as an outdoor rat, the rat population indoors consisting of one species only, viz., *M.r. griseïventer*, also here limited to the house and its compound. *M. concolor* is consequently not driven out by the domestic rat as being smaller, but is not admitted to the house. As long as the population of the domestic rat remains intact, it manages to prevent the invasion of *M. concolor*, notwithstanding the strong inclination of the latter to it as clearly demonstrated by its presence in *pondoks* in the fields, sometimes close to the *desa*. Not before the ranks of the domestic rat have been depleted by plague is the barrier relaxed and begins the invasion of *M. concolor*; then only, and not before, is *M. concolor* able to enter its second stage of domestic rat."

Mus decumanus, the sewer rat, is practically confined to ports on the Coast, where it has been imported by ships and has little epidemiological significance in Java.

As regards fleas, *X. cheopis* is the common flea on the domestic rat. It does not exist, however, on *M. concolor*, except when this rodent has invaded the house.

"*Pygiopsylla ahalae* is much less common in Java than *X. cheopis*, which is due to the fact that it needs a lower temperature and, specially, a higher degree of humidity for its development. Consequently it never occurs in the plains; in fact, it is not found at a lower level than 400–450 M., its optimum being found at a height of 800 M. and more. . . . .

"*X. cheopis*, being proof against a high temperature and a low degree of humidity, but extremely susceptible to the direct influence of moisture, is the ubiquitously distributed, obligatory indoor flea, whose conditions of life and development are closely bound to the house and compound; only in special circumstances does this species occur in the fields as a full-grown insect, rapidly disappearing, however, when the rains begin to fall.

"*P. ahalae*, less susceptible to moisture but not proof against a high temperature and a low degree of humidity, is an outdoor flea, limited in its distribution to mountain country. Its vital conditions are not absolutely bound to fields and woods, but may be present also indoors, especially at a greater height, where the species is often met with as an optional indoor flea."

On the subject of plague measures there is very much of interest in this part of the report. At one time the baggage and hand luggage of 56,000 natives was searched for ectoparasites by means of sulphide of carbon, with the following results. "Lice, bugs and human fleas (*Ped. hominis* 67 per cent., *C. rotundatus* 24 per cent., *P. irritans* 7 per cent.) predominated; only three rat fleas, *i.e.*, two *X. cheopis* and one *P. ahalae*, were found." Hence it is obvious that human beings do not as a rule carry plague fleas in their baggage, at any rate in Java.

A description of the importance of the housing conditions follows. Its improvement was, of course, designed to render the house unsuitable for the formation of nests. This, as already pointed out, means the substitution of wood for bamboos to some extent and of tiles for vegetable thatch for the roofs. Good appears to result from this work; but unfortunately plague recurred. The explanation of this is given thus:

"Although the favourable results of housing improvement are undeniable, this is not a means of suppressing an epidemic; in connection with the unfavourable housing conditions in Java it is impossible to execute improvements so quickly that they obtain repressive value."

"The secondary invasion of *M. concolor* is an unwelcome complication, but less serious in its consequences in connection with the reciprocal action between the domestic rat and *M. concolor* The latter may penetrate into the dwellings at first in such numbers that the depletion of the population of domestic rats is partly neutralized, but it cannot remain there, being driven back to the fields after an increase in the number of domestic rats has taken place, so that danger from this quarter is of a temporary nature only."

As regards evacuation the author does not appear to have obtained anything like as good results as were obtained in India; and the reason would appear to be that a comparatively short evacuation in India until the "off season" has arrived is sufficient to save many lives. In Java it would appear that the off season is nothing like as well marked as it is in many parts of India, and that the disease not infrequently recurs when the people return to the villages. Fumigation of villages

with SO_2 has been tried very energetically, sometimes accompanied with evacuation and sometimes not. It may be looked upon as only partially successful. The writer says that it is extremely difficult to be quite sure how much is really accomplished by the measures and how much is due to the natural decline of the disease.

On the subject of inoculations he says that it is extremely difficult to get a figure which represents the amount of protection afforded by the operation. That it is useful there can be no doubt.

In conclusion the writer argues that if tiles are substituted for thatch and if horizontal beams of wood are used instead of bamboos this will probably give as much protection as a more elaborate method. The difficulties at present are that the supply of tiles is deficient in Java, and the industry would require a good deal of stimulation. The people do not object to this measure, and he considers that organization might be started to further it.

Moore (J. I.). **Co-Operation of Central and Local Authorities in the Control of Plague.**—*Health.* Melbourne. 1924. Mar. Vol. 2. No. 2. pp. 40–41.

The recent visitation of plague in Queensland lasted about seven months amongst human beings and 14 in rodents before it was eradicated. In the previous outbreak plague continued for a period of 9 years. The writer accounts for the cessation by the hearty co-operation between the central and local authorities. Anti-plague measures took the form of a vigorous rat campaign, and in the year ending August, 1922, 128,000 rats were destroyed. A very large amount of rat-proofing of wharf frontages and of premises where food was stored was also accomplished.

Proceedings of the Transvaal Mine Medical Officers' Association. 1924. Apr. Vol. 3. No. 12. pp. 4–17.—**Conference on Precautions to be taken in Prevention of Plague on the Mines of the Witwatersrand.**

These proceedings are of great interest to all sanitarians. They deal largely with rat catching and anti-plague measures in the compounds of mines. Dr. Haydon, who took part in the discussion, gives some extremely valuable information concerning the habits of wild rodents in South Africa and methods used by himself and his staff in investigating the plague problem and in combating it. A verbatim account of the discussion is given and greatly adds to the interest of the publication.

The President, Dr. Donaldson, remarks that the cage trap gives very much better results in the mine than on the surface; here the break-back trap is by far the most successful. As a way of protecting food and rations against rats in one mine, ventilation pipes were placed vertically with the ends bedded in cement; when this set they had miniature silos, 8 ft. long by 2 ft. diameter; these formed rat-proof stores.

The exhaust gas from motor cars or motor bicycles blown into rat holes is a very useful method of driving them out or killing them if they choose to remain. Rock dumps in the neighbourhood of mines in the Rand have given very great trouble, as they form suitable harbourages for rats. Bird-lime on planks was found useless.

Various other methods known to everybody are described. The sack method may, however, be new: "One . . . . fills a sack partly with meat, mealie meal and bran, and hangs it up with the top flush with the top of the wall of a room. A looped string is tied round the neck of the sack. The rat comes along and hurries into the sack, the native pulls the string and clubs the rat and starts again. This is primitive, but effectual."

Apparently cats have answered extremely well in the Rand. Several speakers have large numbers of cats, 100 to 150 in one case, and they are the best solution of the rat problem. Cats should receive food regularly, namely, a little milk and a small piece of meat daily, but should not be overfed. Under this treatment they will catch rats better than if they are starved.

Dr. Haydon commented:—

"The reason why the gerbille is the most dangerous is because he is the most numerous, breeds most rapidly, and has an extraordinary habit of visiting; he is a gossiper. Our rodent inspector, Mr. Powell, has taken an enormous amount of trouble in searching out the habits of gerbilles. Every night they may visit every other gerbille burrow within a thousand yards. Water rats do not visit each other's burrows. This area here, coloured brown, in the Eastern Karroo (indicating on map) is just as thickly populated with water rats as the blue and yellow areas are with gerbilles, but they do not visit. The water rats take plague occasionally, but where gerbille areas and water rat areas overlap the disease has not appreciably spread amongst the water rats.

"The gerbille's habits are such that he does not come into houses, barns, or mealie stacks, and cannot thrive and multiply except in light, sandy soil with sweet grass and bulbs.

"The intermediate carrier of infection from the gerbille to man is the multimammate mouse. He lives in the veld to some extent, but he also comes into people's houses and backyards; he picks up the fleas from the dead gerbilles. He is very much like the ordinary house mouse, only slightly bigger. (Indicating stuffed specimen.) Those are the two chief culprits . . . . . .

"Whenever our inspectors have found in the Free State, or any other area where human or rodent plague has occurred, in any stack of maize (and at some of the sidings there were 30,000 or 40,000 bags piled up awaiting transport), any evidence of rodent mortality, such stack was immediately quarantined. No maize has been removed from any infected stack until it was put through an elevator. The elevators came in the nick of time. The actual treatment of such maize was as follows: Before it could be handled at all it was necessary to spray it to kill fleas. That was done with formalin solution 2 per cent., which removed the immediate danger. After spraying it could be safely handled, trucked and sent to an elevator. The elevator treatment finally removes all danger of infection. I do not know whether everybody is familiar with the elevator system. The grain is put through various grades of sieves, and meanwhile a forced draught removes all dust, fleas, weevils, etc., which come down a special chute, are received in bags damped with disinfectant, and then removed to a furnace. It may be partly luck that no infected maize has so far reached the ports or the big towns, but I am quite certain that fact is largely due to the care of the railway department, acting under advice and supervision of health officials. The danger is not over. Plague will recur at intervals for many years . . . . .

" The way I would suggest for domestic rodents in rock dumps would be the baiting system that Mr. Powell has found so useful. It is absolutely impossible to gas in the case of rock dumps ; the interstices, the inlets and exits are too numerous, but the baiting method as advocated by our department has been found fairly successful in similar circumstances. We make special places with timbering, boxes, packing cases, lumber and what not, which rats can get into and which dogs, cats and children cannot get, and the rats are left quite undisturbed. But the baiting places are so arranged that those responsible can get at them every day and bait the rats. We put down new bread and new milk fresh every night ; what is left every morning is removed or burnt. They are baited for a matter of ten or fourteen days, often longer, until one has the entire confidence of the rats—until they know they can come to two or three safe places. By spreading a little flour on the ground one can find out by observation about how many rats come to feed. One may go on baiting for two or three weeks When one has the complete confidence of the rats, then white arsenic is added to the bread and milk and well mixed. In one night at the south arm at Capetown, our rodent inspector, Powell, killed a matter of between 400 and 500 ; but the method has to be carefully watched. It is impossible to be done by a native; he has not the intelligence. It is a case of matching a man's brains against a rat's brains, and a rat's brains are pretty good."

WATER.

Houston (Alexander). **The Purification of Water Supplies.**—*Surveyor & Municipal & County Engineer.* 1924. July. 11. Vol. 66. No. 1695. pp. 27–28.

" Recently Dr. Thresh has been carrying out some highly successful experiments, and he has courteously allowed me to give you a preliminary account of the results obtained.

" The problem was to soften, sterilise, and render physically attractive impure river water.

" Enough lime (in the form of milk of lime) was added to the river water to combine with the dissolved carbonic acid and bicarbonates, and leave an excess of from 1·5 to 2·5 parts of CaO per 100,000. The amount of lime necessarily varied considerably, but may be stated as approximately from $2\frac{3}{4}$ lb. to $3\frac{1}{4}$ lb., of CaO per 1,000 gallons.

" The lime-treated water flowed through a tank with baffling walls, holding 24 hours' flow when working at the rate of 1,000 gallons per hour. When the excess of CaO was 0·5 (or over) the outlet water contained no *B. coli* in 100 c.c., although the inlet water frequently contained this microbe in 0·01 c.c.

" After leaving the liming tank the water filtered through sand at the rate of 56 gallons per sq. foot per hour, and the final filtrate was transparent, reasonably free from brown colouration, tasteless, and contained no *B. coli* in 100 c.c.

" For removing the slight causticity of the limed water and improving the filtration results, small doses of sulphate of alumina (about 1 to 2 parts per 100,000) were added to the water as it left the lime tank.

"Other substances were also tried—*e.g.*, carbonic acid gas generated from coke, nitric cake solution, and sodium bicarbonate—and apparently the CO_2 is giving the best results.

"The following results for April and May may be regarded as fair average comparisons for the best and worst months of the quality of the river water being treated, the limed water, and the final filtrate :—

Average results for April, 1924, per 100,000.

	Raw river water.	Limed water.	Filtered and fully treated water.	Per cent. reduction.
Turbidity	24	—	0	—
Colour	23	10·5	5·5	76
Free lime at end of 24 hours	—	2·7 Ca_2HO	0·2	—
Free CO_2	0·6	0	0·0	—
$CaCO_3$	22·5	4·8	3·4	—
Total hardness	28·7	16·0	12·5	56
Chlorine	4·9	—	—	—
Oxygen absorbed	0·215	0·135	0·10	54
Bacteria, gel. per cc. ...	8,400	9·3	6·4	99·9
Bacteria, agar per cc. ...	1,200	7·1	1·6	99·9
B. coli in from	0·01 to 1·0cc.	—100 cc.	—100 cc.	From 1,000 to 100,000 times improved.

Average results for May, 1923, per 100,000.

	Raw river water.	Limed water.	Filtered and fully treated water.	Per cent. reduction.
Turbidity	114	—	0	—
Colour	29	16·6	8·5	71
Excess lime at end of 24 hours	—	2·25	0·35	—
CO_2	0·64	—	—	—
$CaCO_3$	23·1	4·5	2·4	—
Total hardness	27·6	15	10·5	62
Oxygen absorbed	0·43	0·225	0·15	65
Chlorine	3·9	—	—	—
Bacteria, gel. per cc. ...	7,230	225	49	99·3
Bacteria, agar per cc. ...	2,270	44	9	99·6
B. coli in from	0·1 to 1·0 cc.	—100 cc.	—100 cc.	At least from 1,000 to 10,000 times.

"It will be understood that the conditions of experiment were constantly varying, partly due to natural causes and partly with the object of finding out the best working conditions, but the above figures may be taken as representing approximately what the process is capable of achieving.

"It will be noticed that for April the turbidity was practically entirely removed, the colour was reduced 76 per cent., the hardness 56 per cent., the oxidisable matter 54 per cent., the bacteria 99·9 per cent., and the improvement as regards *B. coli* was at least from 1,000 to 100,000 times.

"For May the turbidity was practically entirely removed, the colour was reduced 70 per cent., the hardness 62 per cent., the oxidisable

matter 65 per cent., the bacteria 99 per cent., and the improvement as regards *B. coli* at least from 1,000 to 10,000.

"These results, obtained quite independently, appear to me to fully justify the conclusions which I ventured to put forward some years ago as regards the value of the excess lime method in well-selected cases . . . . .

"In London we have used, and are using, chlorination with great success.

"The following facts relating to our eight years' experience of chlorinating Thames river water may be of interest :—

Average dose	1 in 2·3 millions.
Highest dose	1 in 1 million (2 in 1 million for 18 hours).
Lowest dose	1 in 4 millions.
Longest run without a break..	368 days (exclusive of stoppages due to drought)
Average number of days of treatment per year (7 years' average, 1917–24).. ..	321, Hampton. 311, Staines.
Highest monthly temperature of river water when treatment was in operation the whole month	20·1 deg. C., July, 1923.
Lowest ditto	4·1 deg. C., Feb., 1924.
Worst month as regards quality of river water (as judged by colour) when treatment was in operation the whole month	Nov., 1923, Colour 111.
Best ditto	Aug., 1919 Oct., 1919 } Colour 36. May, 1920
Longest period of contact before reaching filter beds	West Middlesex works, about 14 days.
Shortest period of contact before reaching filter beds	Kempton Park works, about 4 hours.
Highest calculated saving	£21,134 per annum.
Lowest calculated saving	£10,503 per annum.
Average calculated saving (on 7 years, 1917–24)	£15,923.
Gross calculated saving	£119,639.
Total volume of water treated	184,609·3 million gallons.
Gross amount of chloride of lime (bleaching powder) used	1,075·33 tons.
Average percentage of available chlorine extracted from chloride of lime	33·36.
Average bacteriological result, percentage of samples of chlorinated river water containing no typical B. coli in 10 c.c. (the raw river water before chlorination during the same period contained typical B.coli in 1 c.c. (not 10 c.c.) in 83·2 per cent. of the samples examined	78 per cent.
Average percentage reduction in the "acres of filter beds cleaned" at the works concerned, as compared with 1914–15 (year 523 as compared with 747, previous to chlorination)	30 per cent. reduction.

"At Highfield, on the New River, we use liquid chlorine, but usually only during the flood months of the year. Owing to the difficulty of treating the New River without giving rise to a taste, permanganate of potassium is often used as well, the dose commonly employed being

2 lb. per million gallons. The effect of the treatment is practically to convert winter into summer, so far as the bacteriological condition of the finished product is concerned."

BANERJI (Nani Lal). **The Influence of Hydrogen Ion Concentration on the Dose of Alum and the Mechanism of the Action of Alum in the Clarification of Natural Waters.**—*Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 695–718. [9 refs.]

This paper deals with a subject of vital importance to Calcutta in particular and to all water engineers and sanitarians in the East. Using Hooghly water during the monsoon, when it is always very highly charged with silt, the whole chemistry of precipitation with alum has been investigated, making use of the Hydrogen Ion concentration as a basis of enquiry. Details of the various experiments need not be given, but the conclusions, which are of great importance, will be found below in the author's own words.

"1. Other factors remaining constant, viz., suspended matter, size of particles, concentration of electrolytes, the optimum dose of alum increases as the pH increases and decreases as the pH decreases.

"2. Total hardness plays an important rôle in regulating the dose.

"3. The mechanism of the action of aluminium sulphate is divided into two portions due to (1) unhydrolysed aluminium sulphate, (2) hydrolysed aluminium sulphate, which again is made up of two components (a) sulphuric acid, (b) aluminium hydroxide. The positive aluminium ion from the unhydrolysed portion is the most potent factor in clarification. Then comes the hydrogen ion from sulphuric acid. The last and the least is A1 $(OH)_3$ sol.

"4. The dose of alum can be decreased by the preliminary addition of such a cheap acid as sulphuric acid.

"This last conclusion is very important from the point of economy in water works in case of slow sand filters. During the monsoon, when the suspended matter in the Hooghly goes very high, as much as 1 ton of alumino-ferric, worth Rs.150, is used daily by the Calcutta Corporation. In view of the facts revealed by our present investigation, this huge consumption of alumino-ferric can be much lessened if a smaller quantity of the same is dissolved in acidulated water instead of ordinary water in the dissolving tank. The addition of acid is, however, limited by the pH of the water. If the original pH of the water is not high, we cannot acidify water too much, because it may affect its taste and injure machinery. The dose of alum and acid can be so regulated that the resultant pH may be made such as will not go far from the absolute neutral point=7·0, in which case the taste and machinery will remain unaffected. For a few successive days, the pH of Hooghly water during the monsoon remaining constant, it was possible for us to work out the following dosages :—

5 cc. N/10 H_2SO_4 unaffected).	+300 cc. turbid water—Resultant pH=6·1 (litmus paper			
0·5 parts of Alum	+4·0 cc.	N/10 H_2SO_4—	,,	=6·55
1 part ,,	+3·5 cc.	,, —	,,	=6·3
2 ,, ,,	+2·5 cc.	,, —	,,	=6·7
3 ,, ,,	+1·4 cc.	,, —	,,	=7·00

"Values of pH, as will be seen from the above table, are fairly high for our purpose. We find from the above table that as we increase the

dose of alum we can decrease the dose of acid, and *vice versa*. We can safely go as near as pH 5·75, as the laboratory distilled water with CO_2 dissolved in it which has got the same pH is quite harmless.

" We may mention an interesting fact in regard to the analysis of alum or alumino-ferric. These are generally prepared from bauxite or clay by the action of sulphuric acid and are apt to contain free sulphuric acid. We know of several instances of rejection of samples by chemists on account of the presence of free sulphuric acid in it. In the light of our research the ' acid alum ' may be preferable to ' basic alum.' In this connection we might suggest that it might be profitable to treat the mud from the settling tanks in case of slow sand filters with acidulated water to recover the residual alum. The acidulated water may with advantage be utilized in dissolving a fresh lot of alum in the dissolving tank. A much smaller quantity of alum, however, can now be used, as it has already been supplemented by the alum and acid present in the washed liquor. A saving in the cost of alum can thus be effected."

HAROLD (C. H. H.) & WARD (A. R.). **Report on Experimental Work carried out at the Army School of Hygiene to demonstrate that Chlorine Gas in Association with Ammonia Gas is a more Efficient Sterilizer of Water than Chlorine Gas used alone or Chloros or Bleaching Powder.**— *Jl. Roy. Army Med. Corps.* 1924. June & July. Vol. 42. No. 6, & Vol 43. No. 1. pp. 414–423; 14–23. [4 refs.]

This paper is of very great importance to all responsible for chlorination of water supplies. Anomalous results when dealing with unfiltered supplies have frequently been obtained. The authors deal with the reason for these erratic findings, and also show that if a small trace of free ammonia is added to the water the action of the chlorine is improved. It is unnecessary to give details of the experiments; those interested should obtain the original paper. The conclusions arrived at are given in the authors' own words.

" We are of the opinion that the anomalous results met with in practice are attributable to inhibition, and that the sterilization by chlorine and hypochlorites of waters with a high colloid content, such as may be met with overseas, is unreliable if only an examination for the presence of free chlorine in excess of natural deviation is relied on. Inhibition is induced by broth, excess of organisms, animal and vegetable pollution, and when it occurs an extremely large excess of chlorine is required to effect sterility; and, in fact, a much larger quantity in some instances than is usually employed. For this reason excessive chlorination, with amounts of chlorine up to twelve parts per million, followed by partial or complete dechlorination, as was customary in many parts of France, commends itself to us as a very wise procedure; and this method, which has been already adversely criticised in certain quarters, is undoubtedly based on sound practical experience, and is now supported by scientific experiment.

" In military practice, albuminoid matter is removed or reduced initially by sedimentation or clarification, but recently it has been shown that the clarifying powder used on the regulation water cart does not react with all waters, particularly with soft waters containing

algal growths, and on these occasions the addition of sodium acetate is necessary to ensure coagulation.

" The foregoing experiments indicate that in the control of chemical sterilization chemical analyses are of the greatest value. A high albuminoid figure, especially in conjunction with a relatively low chlorine absorption figure, should attract attention, and the possibility of inhibition must then be considered. When using chlorine gas, sterility should be fairly easily obtained in waters giving a high free and saline ammonia figure, indicating a not too recent nor too distant pollution. Waters containing nitrites in any quantity require a large excess of chlorine and are unsatisfactory to treat.

" The resistance to killing of the different species of excremental organisms in water heavily charged with colloid matter shows considerable variation, and they may apparently be graded in order of susceptibility. As our test organism, we have designedly employed an organism of this group possessing the greatest power of resistance. It must be admitted that when faecally polluted water was used in conjunction with laboratory cultures, the recently passed faecal organisms usually succumbed, whereas, as was expected, our laboratory culture organism (even of agar) proved more resistant. Even assuming that the majority of infective pathogens in moderately pure water can be easily killed by a low concentration of chlorine, the behaviour of the " resistant minority " in waters heavily loaded with colloid matter cannot be foreseen ; and as in military operations the immediate consumption of treated water is the rule, it would appear eminently desirable to adopt a process whereby the most resistant species and types of excremental organisms are readily destroyed.

" Strong corroboration of these findings appears in a recent paper by Mansell on the Chlorination of Milk, in which he points out that if cultures of cholera vibrios, *B. typhosus* and *B. dysenteriae* (Flexner) are added to milk, enormous quantities of chlorine are required to produce sterility ; and even with such amounts *B. dysenteriae* (Flexner) is not destroyed. In this connexion, Winter Blyth found that in milk the Rideal-Walker coefficient was reduced from 2·2 to 1.

" In regard to the increase in the lethal action of chlorine gas, when ammonization is employed, in Experiment No. 8, using chlorine as bleaching powder solution, sterilization in a 1 in 10,000 pollution is effected by three parts per million of chlorine, and in Experiment No. 16, under the same conditions, but employing gas and ammonization, this is attained by one part per million. In addition, a palatable water is produced (*vide* Experiment No. 19), the phenomenon of inhibition does not present itself, and apparently the natural deviation of the water can be ignored.

" This enhanced action does not appear to be due to alteration in the pH value of the water set up by the chemicals, and, as Rideal points out, ammonia compounds are endowed with special penetrative powers. It appears feasible that the organisms or colloids in intimate contact with them take up ammonia first, and on appearance of chlorine gas, chloramine or other chlorine ammonia group compounds are produced *in situ* and exercise their maximum effect.

" The superiority of chlorine gas over chloros and bleaching powder is brought out by these experiments.

" Experiment No. 15 demonstrates that bleaching powder stands fourth in order of efficiency as a chemical sterilizer of water, and this calls for serious consideration. The difficulty of using chlorine gas

instead of bleaching powder with the regulation water cart should not be insuperable, and a suggestion, which may prove to be the solution, has been forwarded to the War Office.

"It is hoped that this investigation, imperfect in many details, may be of use in assisting in the advance of knowledge in the increasingly important field of chlorination. To many interested in this subject it would appear that the repetition of certain somewhat stereotyped stock chemical equations does not satisfactorily explain the process in all its intricate phases, and that further inquiries would be amply rewarded.

"Finally, by a series of experiments, it has been found that the addition of a quarter to half a part of ammonia per million to water prior to its exposure to chlorine gas increases its lethal action, and subsequent tests against various types of pollution have confirmed this fact. A process of such extreme simplicity, capable of universal application, must appeal to all interested in the use of this chemical and its compounds."

Donald (J. R.), Jones (C. L.) & MacLean (A. R. M.). **The Effect of Carbonation on Bacteria in Beverages.**— *Amer. Jl. Public Health.* 1924. Feb. Vol. 14. No. 2. pp. 122–128. With 6 charts. [28 refs.]

A description of experiments on the effect of placing faecal and pathogenic bacteria in ordinary ginger ale treated with carbon dioxide. This subject is of much importance in tropical countries where the consumption of mineral waters is great. An elaborate series of experiments was carried out. Ordinary bacteria and *Bacillus typhosus* were added to ginger ale and the bottles treated with nitrogen under pressure, and with carbon dioxide at 15 lbs. and at 75 lbs. As is now generally known, the effect of CO_2 on these fluids is to sterilize them slowly. The results obtained confirm those already published and also demonstrate that nitrogen under pressure has no influence whatever on the action of bacteria, the rate of increase being similar in the control bottle. The experimental results are best given in the form of graphs. [Figs. 57–60.]

FOOD.

Deeks (W. E.). **The Use of Sweetened Condensed, Evaporated and Powdered Milks for feeding Infants in the Tropics.**— *Amer. Jl. Trop. Med.* 1924. Mar. Vol. 4. No. 2. pp. 113–130.

The writer is the Principal Medical Officer of the United Fruit Co. in America, under whose control are a very large number of American officers. His experience of feeding of infants in the tropics is very extensive. He discusses the relative merits of human, cows', goats' and asses' milk, and gives the analysis of each. He then deals with the prepared milks and gives in tabular form the correct dilution and

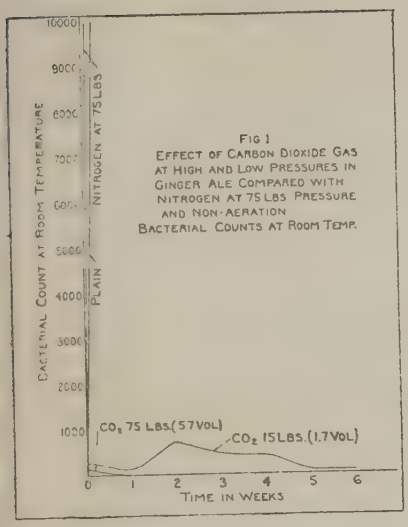
FIG 1
EFFECT OF CARBON DIOXIDE GAS AT HIGH AND LOW PRESSURES IN GINGER ALE COMPARED WITH NITROGEN AT 75 LBS PRESSURE AND NON-AERATION
BACTERIAL COUNTS AT ROOM TEMP.
BACTERIAL COUNT AT ROOM TEMPERATURE
NITROGEN AT 75 LBS
PLAIN
CO₂ 75 LBS.(5.7 VOL)
CO₂ 15 LBS.(1.7 VOL)
TIME IN WEEKS

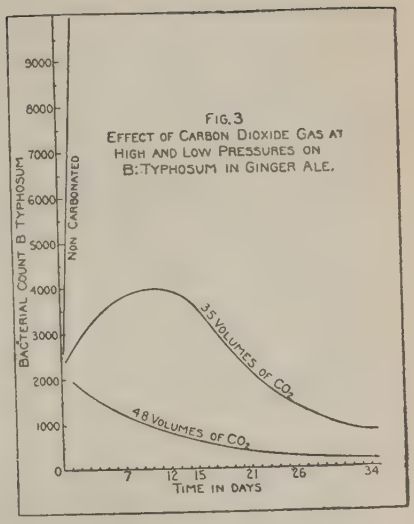
FIG. 3
EFFECT OF CARBON DIOXIDE GAS AT HIGH AND LOW PRESSURES ON B. TYPHOSUM IN GINGER ALE.
BACTERIAL COUNT B TYPHOSUM
NON CARBONATED
3.5 VOLUMES OF CO₂
4.8 VOLUMES OF CO₂
TIME IN DAYS

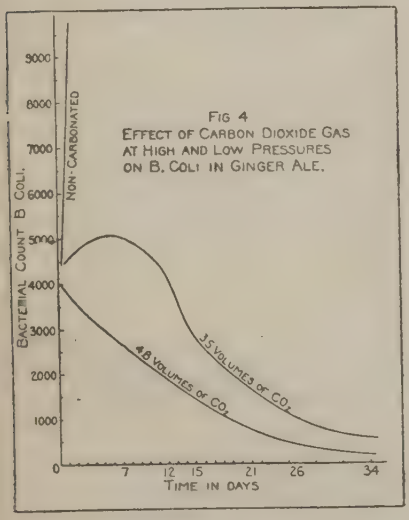
FIG 4
EFFECT OF CARBON DIOXIDE GAS AT HIGH AND LOW PRESSURES ON B. COLI IN GINGER ALE.
BACTERIAL COUNT B COLI
NON-CARBONATED
3.5 VOLUMES OF CO₂
4.8 VOLUMES OF CO₂
TIME IN DAYS

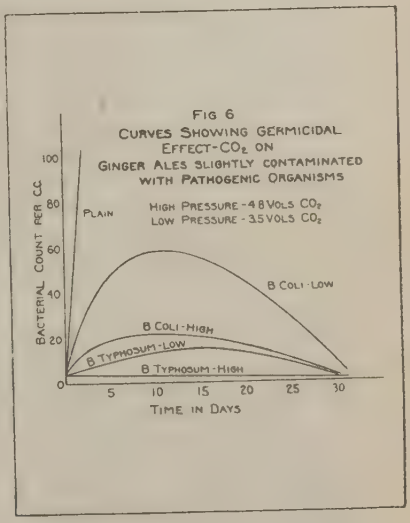
FIG 6
CURVES SHOWING GERMICIDAL EFFECT-CO₂ ON GINGER ALES SLIGHTLY CONTAMINATED WITH PATHOGENIC ORGANISMS
BACTERIAL COUNT PER CC
PLAIN
HIGH PRESSURE - 4.8 VOLS CO₂
LOW PRESSURE - 3.5 VOLS CO₂
B COLI - LOW
B COLI - HIGH
B TYPHOSUM - LOW
B TYPHOSUM - HIGH
TIME IN DAYS

FIGS. 57–60.—Comparison of effect of carbonation and non-carbonation on bacteria in an ordinary ginger ale at room temperature.

[Reproduced from the *American Journal of Public Health.*]

method of use of (*a*) sweetened condensed milk, (*b*) evaporated milk with sugar added, and (*c*) milk powder known to the trade as "klim." The instructions for use of this are given in the table below.

Age of infant.	Daily amount necessary.	Milk powder (klim).	Cane-sugar, milk-sugar, or dextri-maltose.	Water (sufficient to make).	Amount of each feeding.	Interval of feeding.	Number of feedings daily.
	ounces.	tea-spoon-fuls.	tea-spoon-fuls.	ounces.	ounces.	hours.	
1 day ...	1–4	—	—	1–4	½–½	2–4	4–8
2 ,, ...	6	2	2½	6	½–1	2	6–8
3 ,, ...	10	4	4	10	½–1	2	8–10
4 ,, ...	11	6	4	11	1–1½	2	10
5 ,, ...	13	8	5	13	1–1½	2	10
6 ,, ...	14	10	5	14	1½	2	8–10
7 ,, ...	15	14	5	15	1½–2	2	8
1–4 weeks ...	15–25	4–7	5–7	15–25	2–3½	2½	8
1–3 months	25–35	7–10	7–10	25–35	4–5	2½	6–7
3–6 ,, ...	40	11–44 [? 14]	12–14	40–50	6–8	3	6
6–12 ,, ...	50	14	14	50	8–10	3–4	5–6

This powder will keep in a warm country for 3 or 4 months. The manufacturers claim that the vitamins are not destroyed in the process of manufacture. The analysis is given below :—

Butterfat, 28·00 ; protein, 26·74 ; milk sugar, 38·00 ; ash, 5·76 ; water, 1·50.

The preparation is slightly deficient in fat, but this is of no great importance in tropical countries.

As a substitute for cane sugar dextri-maltose is recommended. It consists of maltose 51 per cent., dextrin 47 per cent., sodium chloride 2 per cent. It is specially indicated for infants in whom it is desired to get an increase in weight "without causing sugar disturbance." It is probably not known to many officers in the tropics that tomato juice is as satisfactory as orange juice for children who are fed on the ordinary sweetened condensed milk ; even tinned tomato juice is efficacious if the fresh fruit is not available.

CONSERVANCY.

Temple (Frederick Charles). **"Notes on the Drainage of Country Towns in the Plains of India."**—The Institution of Civil Engineers. Selected Engineering Papers. No. 16. 31 pp.

In the last number we published a review of a paper written by Mr. Temple, Sanitary Engineer for the Tata Steel Works at Jamshedpur. We have now obtained a copy of the original article and find in it much that is of very great interest to all sanitarians in the East. We strongly recommend that the paper be consulted in original by sanitary engineers generally.

The following brief résumé is given by the author himself :—

"A town that does not contain more than 5,000 persons can probably do very well without any drainage system at all. When the population exceeds 5,000, a surface drainage system for storm water and

sullage will materially improve the sanitary condition of the town. It should be designed as a complete whole, whether it is all carried out at one time or not. The drains should be capable of taking a discharge of $\frac{1}{4}$ inch per hour from the whole of the area served. The sizes should be calculated by short lengths, and the greatest possible care should be taken to secure the full advantage of every inch of available fall by keeping the summits as near the surface as possible, and by following natural gradients instead of cutting through the subsidiary ridges. All drain junctions must be designed and constructed with the greatest care. Arrangements should be made for cleaning and flushing by pumps fitted in wells, unless there is a piped water-supply, when ground hydrants should be provided. Advantage should be taken of all possible outfalls where the dry weather sullage can be distributed over land on which coarse crops may be grown. It is not worth while to install purification works for dry weather sullage, unless the outfall is such that distribution on land is impossible and there is a serious objection to discharging the sullage in a crude state at the end of a drain (for instance, an area of a town may drain into a lake which is used for bathing purposes ; in such a place it is obviously desirable to make special arrangements to purify the sullage so that it will not create a nuisance in the lake).

"As soon as a piped water supply is installed, every effort should be made to install also a water-borne sewerage system, which should be designed on as simple lines as possible. In a very flat area, deep sewers can be avoided, and a scheme brought within the financial powers of the town by septicizing the sewage in numerous small septic tanks as early as possible, and only running effluent through the sewers. This may make a gravity system possible, and even if pumping is still necessary, the depth from which the sewage has to be lifted will be much less, and the working expenses less in proportion.

" The yield of green fodder-crops grown on land manured with the sludge and irrigated with the effluent is amazing. Ten control plots of land, so barren that the local cultivators refused to cultivate it, gave the results shown in the Appendix.

"The purification is far more satisfactory than that obtained by any other method tried by the author, and the possible return in crop value is far higher. The process is, however, far too complicated for a small country town. It is possible that some one or other of the many modifications of the process now being introduced may prove suitable. If that should occur, and the crop yield be maintained at anything like that already obtained, there is good hope that the introduction of this process may bring water-borne sewerage systems within the reach of many small towns which otherwise could not consider them."

The concluding paragraphs of this report deal with the subject of activated sludge in India. The reviewer has always held the opinion that this is the real solution for the many evils that occur in that country in places that can afford the underground system of drains. Mr. Temple's installation at Jamshedpur deals with 150,000 galls. per day derived from a population of approximately 3 to 4 thousand people. He says that with a very slight modification it would be possible to deal with 240,000 galls., or approximately double the number of people. As is well known, the results of activated sludge as a manure are extremely satisfactory. This has been tested by Mr. Temple, and the following table sets out his findings under this head :—

Experiments with Oats manured in Different Ways.

Plot.	Area of each plot. Acre.	Seeds per plot.	Manure per plot.	Added nitrogen per plot.	Irrigation.	Observation.	Appearance of every plant. Sizes in inches.	Yield per plot of Green fodder. First cutting. lb.	Yield per acre. lb.	Yield in units per acre.
1	1/40	2½ lb. 16–12–22	No manure.	Nil.	Water	Growing in thin patches of pale green colour	Height, 14·0 Breadth of leaf 0·25 0·50	29·0 25–2–23	1,160	1·0
2	1/40	2½ lb. 16–12–22	Ammonium Sulphate 7 lb.	1·4 lb.	,,	Growing in thin patches of pale green colour	Height, 16·0 Breadth of leaf 0·3 0·6	62·0 25–2–23	2,480	2·1
3	1/40	2½ lb. 16–12–22	Cow-dung 140 lb. Ammonium Sulphate 3½ lb.	1·4 lb.	,,	Growing well in thick patches of both pale and dark green	Height, 17·0 Breadth of leaf 0·3 0·5	336·0 15 2–23	13,440	11·6
4	1/40	2½ lb. 16–12–22	Cow-dung 280 lb.	1·4 lb.	,,	Growing well, like 3	Height, 19·0 Breadth of leaf 0·3 0·5	194·0 14–2–23	7,760	6·7
5	1/40	2½ lb. 16–12–22	Cow-dung 560 lb.	2·8 lb.	,,	Growing well, like 3	Height, 24·0 Breadth of leaf 0·4 0·5	222·5 14–2–23	8,900	7·7
6	1/40	2½ lb. 16–12–22	No manure	Nil	Activated Sludge effluent	Growing well, with dark green colour	Height, 21·0 Breadth of leaf 0·4 0·5	360·5 13–2–23	14,420	12·4
7	1/40	2½ lb. 16–12–22	Activated sludge 1,000 gls 50 lb. D.M.	3·5 lb.	,,	Growing very thickly, with dark green colour. Roots deprived of light	Height, 30·0 Breadth of leaf 0·4 0·6	762·0 13–2 23	30,480	26·3
8	1/40	2½ lb. 16–12–22	Activated sludge, 500 gal. 10 lb. D.M.	0·7 lb.	,,	Growing thickly, with dark green colour. Roots deprived of light	Height, 31·0 Breadth of leaf 0·4 0·6	449·0 12–2–23	17,960	15·5
9	1/40	2½ lb. 16–12–22	Ammonium Sulphate 7 lb.	1·4 lb.	,,	Growing in thin patches	Height, 23·0 Breadth of leaf 0·5 0·7	128·0 12–2–23	5,120	4·4
10	1/40	2½ lb. 16–12–22	Cow-dung 560 lb.	2·8 lb.	,,	Growing well, with dark green colour	Height, 32·0 Breadth of leaf 0·4 0·6	410·0 12–2–23	16,400	14·1

O'Shaughnessy (F. R.). **Sewage Disposal and the Community.**—*—Surveyor & Municipal & County Engineer.* 1924. July 11. Vol. 66. No. 1695. pp. 37–39.

The following short extract is taken from the above paper concerning the economic effect of the drainage in the town of Colombo :—

" Mr. R. E. Tickell, O.B.E., M.Inst.C.E., lately city engineer of Colombo, speaking at the Institution of Civil Engineers on Feb. 11, 1923, remarked that ' money spent upon a drainage scheme was always put down as unremunerative expenditure,' and that the commonly-accepted opinion was that it ' was merely getting rid of a waste product.' Also this ' entirely mistaken point of view carried weight with authorities who dealt with the allocation of public funds.' Quoting from a paper in the Journal of the Royal Statistical Society (' The Statistics of Industrial Morbidity in Great Britain,' by E. A. Rusher, Vol. lxxxv (1922), p. 27), Mr. Tickell indicated that ' the economic value of the drainage was the benefit derived from a reduction in the rate of sickness,' the average time of sickness being 180 weeks for each death. Following the installation of the drainage scheme at Colombo, the death-rate fell by six per thousand, which, on a population of 300,000, meant 1,800 lives per annum. This, again, meant a saving of 324,000 weeks of sickness.

" The financial saving was as follows :—

On 1,800 funerals	Rs. 180,000	per annum.
Keep at only Rs. 5 per head per week ...	1,620,000	,, ,,
Total	Rs. 1,800,000	,, ,,

Silcock (E. J.). **Sewage Disposal of Towns on Tidal Estuaries.**— *Jl. Roy. San. Inst.* 1924. May. Vol. 44. No. 12. pp. 462–464.

" Purification by dilution in a tidal river depended upon the quantity and quality of the water into which the sewage was discharged and the velocity of flow in the river. It would be useless to dilute sewage with polluted water. The water must contain plenty of free oxygen. The quantity of river water should be sufficient to give a large degree of dilution, and the velocity of the current must be sufficient to effect diffusion of the sewage and to prevent settlement. Then it was necessary to consider the complications produced by the reversal of tidal currents, and for this reason it might be necessary to hold up the sewage and to discharge it only at certain states of the tide. If the sewage was not properly diffused, or if it were held up in pools or backwaters or places where the velocity of the current was small, sewage matters would be deposited, and these would putrefy and cause trouble. One of the main objects was, therefore, thorough diffusion of the liquid in the stream, and another was that there should be a sufficient volume of diluting water. If the suspended matter in the sewage was sufficient to produce deposit in the river, then the sewage must be treated in tanks before it was discharged. . . .

" It appeared, however, that one in 500 was a very safe figure. If it were necessary to treat sewage partially, the material in suspension could be removed. The material in solution might, however, cause a nuisance, and therefore some partial oxydising process might be needed. If that had to be done percolating filters or activated sludge treatment would provide what was required."

Shenton (H. C. H.). **Sewage Disposal of Towns on Tidal Estuaries.**—*Jl. Roy. San. Inst.* 1924. May. Vol. 44. No. 12. pp. 464–467.

"Recently experiments have been carried out in the treatment of the sewage of London, by the activated sludge process, with results which suggest that this may prove to be the solution of the problem.

"That the activated sludge system is likely to be suitable and economical for the treatment of the sewage of towns on tidal estuaries is clear, first, because the fall which is required when filters are constructed, and which generally involves pumping, is not required in the activated sludge process; next, because the effluent can be purified to the exact degree required, and the sludge can be completely purified. These are very important advantages. . . . .

"Dr. Fowler and his colleagues generously gave the result of this discovery to the world in general, allowing the manufacturer, the chemist, and the engineer to perfect the system of treating sewage by the method which they had discovered. For some years only one firm of manufacturing engineers took advantage of Dr. Fowler's discovery, but later, when the possibilities of the process had been proved on a large scale, other workers and manufacturers developed various systems, whereby treatment and partial treatment of the sewage can be effected. These systems are now before us, and it is the duty of the engineer, who has to design sewage disposal works, to find out which system is most suitable to the peculiar conditions of each case, and possibly to work out other methods.

"In considering which method may be most suitable for any particular place, the choice must be governed by a variety of special conditions, which will undoubtedly be present, and until these have been examined carefully, it is impossible to tell which method, or combination of methods, is most applicable. There are various methods—for instance, there is the diffused air system, which has been applied successfully at Manchester, Worcester, Hanley and many other places, and has been adopted for the treatment of the whole of the sewage of Reading, and for other towns in this country, and also for the treatment of the sewage of Milwaukee, Chicago, Houston Texas, Indianapolis, and many other places in America, and which is also being adopted extensively in the colonies and at many places abroad. The results of this system are, therefore, ready to hand, and ready for examination. Then, again, there is the paddle mechanical agitation system, which has been very successful in the treatment of part of the sewage of Sheffield, and which has now been adopted for the treatment of the whole of the sewage of that city. It has also been adopted at East Ham, where it is working, and at several other important places. Another very important mechanical agitation system is that invented by Mr. Bolton, in use at Bury and Birmingham. Other experiments have been carried out in the use of paddles and mechanical devices at various places, including London and Glasgow. Attempts have also been made to obtain the necessary agitation by the use of pumps and immersed propellers relying on surface aeration and so forth.

"While it is impossible to say off-hand which method should be adopted at any particular place, it is useful to consider the merits of each system in the abstract, and unless this investigation is made fully and impartially we shall come to false conclusions."

Temple (F. C.). **Grit Catchers, Screens and Storm Water Tanks in Sewage Disposal Works.**—*Surveyor & Municipal & County Engineer.* 1924. Aug. 1. Vol. 66. No. 1698. pp. 105–106.

"These remarks may be summarized as a set of rules :—

"Place two sets of screens in the path of the sewage, the first with 1-in. openings, and the second with ½-in. openings sufficiently far apart to admit of easy removal of the screenings.

"Ascertain the average daily dry-weather flow, and provide grit catchers of sufficient cross-sectional area to reduce velocity to 1 ft. per second, and of such a length or shape as to allow 30 ft. travel of the sewage in the grit catchers. Provide stand-by grit catchers of the same relative capacity to deal in the same way with the maximum flow to be allowed through the disposal works.

"Ascertain the maximum possible discharge of the sewer to the works, which is limited by the cross section and gradient of the sewer and the area that it drains ; decide the maximum quantity of this discharge which may be allowed through the ordinary disposal works ; arrange an overflow weir, above the inlet to the grit catchers, to draw off everything above that quantity ; and provide storm-water tanks 120 ft. long of such a cross-section as to reduce the velocity of all that passes the overflow weir to 0·1 ft. per second.

"Unless there is some unusual condition requiring unusual treatment, a plant designed on these lines appears likely to give satisfactory service."

Wille (W. A.). **De septic tanks van Soerabaja.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 2. pp. 324–338. With 3 text figs. [4 refs.]

Wille offers further criticism (see Sanitation Supplement, *ante*, p. 32) to Clemesha's type of septic tank, which was defended in previous issues of the same periodical by Frumeau, Grijns and van Santwijk (*loc. cit.* p. 118). In Wille's opinion the grit chamber is not an essential part of the tank, and it would soon be choked unless a considerable flush washed away a good part of the solid faeces to the second compartment of the tank, where they form the floating layer. He asserts that without a grit chamber the solid faeces are sufficiently softened to be further deteriorated. [In the annotator's opinion he mistakes Clemesha's term "disintegrated," which he considers equivalent with "dissolved."]*

Doorenbos (W. B.). **Latrines en vliegen.** [Latrines and Flies.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1924. Vol. 64. No. 2. pp. 308–312.

The author experienced much difficulty in keeping pit latrines on rubber estates free from flies. Filling of the pit with earth 5 days after burning dry material in it was not sufficient. He therefore abandoned this system and introduced receptacles (kerosene tins) in which a small quantity of weak izal solution was sufficient to repel the flies. These receptacles are emptied daily in a single well-closed sewer. He remarks that pupae and larvae may be found in the soil at a distance of over 3 feet from the latrine pits.*

* Summarized by Dr. W. J. Bais.

Smith (J. Waldo). **The Beccari Process of Garbage Disposal.**— *Amer. Jl. Public Health.* 1924. Feb. Vol. 14. No. 2. pp. 119–121. With 1 fig. & 1 chart.

A description of a new form of disposal of street refuse called the "Beccari process," after the Medical Officer of Florence, who invented it. The description is given in the author's own words with a picture of the plant at Florence. (Fig. 61.)

"When delivered to the plant the garbage is first dumped into a court between the rows of cells and hand-picked of all those materials having a commercial value. This covers pretty nearly everything. The fermentation would be just as effective and just as rapid if this sorting were not done. The garbage at Florence differs somewhat in composition from American garbage. It contains less meat, less grapefruit and orange rinds, and is less wet than in this country.

Fig. 61.—Beccari waste disposal plant at Florence, Italy, using 208 cells and dealing successfully with the garbage of a city with a population of about 250,000.

[Reproduced from the *American Journal of Public Health.*]

"The sorted garbage is then piled in the main court, where it is placed in hand carts and taken to the cells. In doing this, a check is made on the first sorting, so that all of the salvagable material is eliminated. The cells are filled so far as possible from the side doors and the remainder of the filling is done through the hatches in the tops of the cells.

"The first step in the fermentation is marked by an increase in temperature shortly after filling, up to 140° F. or more, accompanied by the development of vast numbers of bacteria. Numerous experiments have been made to discover the effect of the action of the cells upon virulent micro-organisms of typhoid, cholera, scarlet fever, trachoma, anthrax and others. It is found that even the most persistent, such as anthrax, are completely destroyed. The larvae of

flies, fleas, and other parasites are also destroyed, while the germinative power of all seeds is likewise checked.

" Bones come out clean ; even the marrow is completely eaten up by the bacteria. The bodies of dead animals are completely reduced, leaving a slightly humid mass, quite without odour.

" After fermentation is complete—thirty days is the minimum time and about thirty-five the average—the product is loaded into hand carts and taken to the large storage shed. Here it is placed in a long pile about six feet or more high, and after standing from five to fifteen days is screened. That portion rejected after screening is allowed to remain in the storage shed for further reduction and then screened. To get a higher grade of fertilizer for special purposes, the product is rescreened through finer sieves. In many cases the product is taken away without screening, just as it comes from the cells."

SMALLPOX VACCINATION.

McVail (John C.). **Small-Pox and Vaccination in the Philippines.**—*Brit. Med. Jl.* 1924. Aug. 16. pp. 281–282.

" Unquestionably the health department of the Filipino Government is striving after better things. But its difficulties are immense, and no good will be done by too ready assumptions as to cause and effect in the domain of disease prevention. It is certain, however, that good vaccine, skilfully used and not destroyed on the skin of the vaccinee, will protect against variola those who resort to it and who renew their protection as may be required.

" As regards fatality rates of smallpox in 1922, the figures are (fortunately) insufficient to be of much statistical value. In Manila there were no cases, in the Provinces 12 deaths occurred in 126 cases of smallpox, and in Mindanao and Sulu 7 deaths in 14 cases. In addition there were in the Provinces 183 cases of ' varioloid ' with 4 deaths. If these be added to the smallpox figures the fatality rate is, of course, lowered. It is regrettable that neither in this nor in previous reports is any statement made as to the differential diagnosis between variola and varioloid, as the terms are used in the Philippines. It would be worth knowing whether merely mild cases are put in the latter category and more severe cases in the former, or whether there are two recognizably different types of the disease. The latter view is rather supported by the fact that in nearly all the provinces where ' varioloid ' occurred there was no ' smallpox.' Bohol had 61 varioloids, and Cavite 63, without a single death or a single registration of smallpox. The province of Oriental Negros, however, had 115 smallpox cases with 10 deaths, and 6 varioloids with one death, while Samar had no death in 6 smallpox cases and 7 varioloids. Very remarkably, Sorsogon had no smallpox cases, but 3 varioloid, all of which were fatal. Perhaps in his next annual report, or even earlier, which would be better, the Director of Health will deal with this question, bearing as it does on the whole subject of mild smallpox, which is of so much interest to epidemiologists at the present time."

Tanon (L.). **La conservation du vaccin antivariolique dans les pays chauds.**—*Rev. Prat. Malad. des Pays Chauds.* 1924. Mar. Year 2. Vol. 3. No. 7. pp. 534–546.

The writer discusses the manufacture, storage, and transport of vaccine lymph in hot countries. His conclusions are that in Institutes in large centres cold storage and ice chests are the best way of preserving the lymph and that for dispatch into the interior dried vaccine is superior to any other.

DISINFECTION.

Bellon (P.). **Dératisation à bord des navires.**— *Ann. d' Hyg. Publique, Industrielle et Sociale.* 1924. Apr. New Ser. Vol. 2. No. 4. pp. 245–249.

The writer discusses the somewhat vexed question of killing rats on board ship, and after comparing several methods from a large amount of practical experience he concludes that the most efficacious means is the employment of sulphur-dioxide in cylinders. A minimum quantity of 68·5 grams per cubic metre of the ship's hold is used, corresponding to a concentration of $2\frac{1}{2}$ per cent. of gas in the atmosphere. A contact of two hours is necessary for satisfactory results, the period to commence from the time when the liberation of the gas has ceased.

Mandoul (A. H.). **Sur la dératisation des navires. Emploi de la chloropicrine.**— *Jl. Méd. de Bordeaux.* 1924. Aug. 10. Vol. 101. No. 15. pp. 660–661. [1 ref.]

Saint-Sernin. **Désinsectisation des locaux à terre par la chloropicrine.** —*Ibid.* pp. 661–663.

Randier (P.). **Quelques réflexions au sujet de la chloropicrination du "Kronstadt."**—*Ibid.* pp. 663–665.

Marcandier. **Recherches sur pouvoir insecticide et bactéricide de la chloropicrine.**—*Ibid.* pp. 665–672.

These papers deal with the use of chloropicrine for killing fleas, bugs, cockroaches, etc., in ships. The matter has been frequently dealt with in these supplements. Reference is also made to the experiment on the "Kronstadt," which has also been described. It is not necessary to discuss the matter further. There is, however, one point which is new, namely, the action of chloropicrine on bacteria, which is given in the last paper. These results show that, like all other gaseous disinfectants, the efficacy depends both on the concentration and the time of exposure. In ordinary diffused light at a temperature of 17 or 18°C. the dose necessary to kill coli and staphylococcus on the surface in 24 hours appears to be 50 grammes per cubic metre. Below this point a longer exposure is necessary. The elevation of temperature and increase of humidity increases the action of the drug. The effect of light during the experiment is curious; it appears to increase the potency of chloropicrine in vapour. It is not, however, due to condensation affecting the bacteria. Chloropicrine will kill tubercle bacilli in 24 hours in air saturated with the vapour. Wet sputum is more easily sterilized than dry. Sporulating bacteria are much more difficult to kill and the results are more erratic.

Fernandez (E. H.). **Two Experiments in the Use of Anhydrous HCN.** —*Med. Jl. S. Africa.* 1924. July. Vol. 19. No. 12. pp. 378–384. With 2 figs.

The writer describes in the following words a somewhat novel method of treating cabins of a ship with hydrocyanic acid in order to kill rats, cockroaches, etc.

"The technique employed in the operation by Messrs. Kynoch's representatives was very simple. The amount of HCN used was about 124 ozs. contained in ten 8-oz. bottles and eleven 4-oz. bottles. These bottles were placed each in a small canvas bag, like the old-fashioned watch-pocket that hung at the head of a bed, to which a string was attached. The string was fastened to a convenient support, and the bottles were placed in the position which they were destined to occupy, half on one side of the ship and half on the other. Two experimenters walked from the outer end to the after end of the place to be treated, removing the stoppers of the bottles as they went down. Having reached the far end they tipped over the bottles, so that they were hanging with the mouth downwards, the contents decanting on to the floor and tipping over each bottle in turn until all were in operation. The moment they came out into the open, the doors were battened to and the cracks and all spaces closed by having paper pasted over them.

"The solution of HCN used contains ·6 cubic ft. of gas to each oz. and therefore the quantity of 124 ozs. used for 22,000 cubic ft. gave the quantity of gas released = 1 in 300. The cost of the material is about 5s. for the 8-oz. bottles and 2s. 6d. for the 4-oz. bottles, amounting in this experiment to about £4."

The occasion was used to try certain experiments with cockroaches, fleas, bugs and rats. Such practical points as whether rats or fleas shut up in cupboards would survive were investigated. The conclusions of a preliminary experiment are given as follows :—

"The closing of the lockers, as we discussed, shows by the bugs therein remaining alive, that the gas did not completely penetrate into them, though they were of rough construction and in no way airtight.

"On the other hand, the death of all other insects both at top and bottom of cabin points to an even diffusion of the gas.

"The canvas bags used to suspend the bottles upside-down, so that the liquid could run out slowly compared to the breaking of an ampoule, appears a decided improvement.

"The death of the five fleas in the locker against the death of only two of the bedbugs is interesting."

General Conclusions. "That an opening of small size makes little or no practical difference to actual results. It must be remembered that it may be a source of potential danger to curious and ignorant onlookers.

"That the concentration of HCN in the neighbourhood of the middle stratum of air is sufficiently powerful for all practical purposes after the expiration of fifteen minutes.

"That the higher and sufficiently lethal concentrations of the HCN are first found in the upper strata of air and that the time required to reach these levels, if of reasonable height, is not more than fifteen minutes.

"Diffusion. That the concentration at the lower levels naturally takes the longest time to give a lethal dose ; about three inches above

the level at which the HCN was poured, the concentration after 45 minutes was only $\frac{1}{1120}$ but after 80 and 95 minutes, samples of air taken from the same spot showed a concentration of $\frac{1}{320}$.

"That an ordinary cupboard at or below the level at which the HCN is poured will not admit sufficient gas to give results of any value within two hours, and since the concentration was only $\frac{1}{1650}$ 65 minutes, and $\frac{1}{1500}$ 80 minutes after pouring, it does not seem likely that there would be sufficient subsequent improvement to be of any value. The American Quarantine regulations (1920) specify for the destruction of rats and mice an exposure for two hours to a strength of $\frac{1}{437}$. Samples of air taken from just outside the door of this cupboard showed a concentration of $\frac{1}{350}$ 80 minutes after pouring and $\frac{1}{320}$ 95 minutes after. It is therefore advisable to see that all cupboard doors at or below floor level are left open during operations.

"Cupboards more favourably situated in regard to height from the floor do not offer sufficient protection to keep alive rats even when the doors are closed and turned to face close up against a wall. At the same time, when the marked difference in concentration which must be found inside and outside cupboard doors is considered, it is better that all such should be left open."

Public Health Reports, 1924. Mar. 14. Vol. 39. No. 11. p. 529. —**Cyanogen Chloride Gas Mixture. Irritating Quality of New Fumigant saves the Life of a Stowaway on Vessel being fumigated.**

The writer describes how when fumigating a vessel with cyanogen chloride a stowaway was driven out, before he was poisoned, owing to the irritant effect of the gas. Although in a dazed condition he rapidly recovered. Had HCN been used he probably would have died.

Joffick (S. D.). **Observations on Kerosene as a Delousing Agent.**—*China Med. Jl.* 1924. Apr. Vol. 38. No. 4. pp. 318–322. [7 refs.]

The writer was engaged on famine relief work of the American Red Cross and had occasion to delouse the clothes of a large number of people. "The billets were disinfected by coal tar solution (3–5 per cent.). The bedding was put in the sun and sprayed with kerosene. The clothing was ironed. The coolies themselves were given a kerosene bath. Their clothing was frequently also treated with kerosene. This was the routine used for disinfection."

As a result of these measures kerosene oil baths became distinctly unpopular, and no amount of endeavour on the part of the writer was able to overcome this. He therefore came to the conclusion that kerosene was not altogether a satisfactory insecticide for lice, and made certain experiments of his own, the results of which are given.

"Result 1. After one to two minutes' immersion, out of the groups totalling 100 lice, 86 recovered, and 72 of these laid eggs after being fed.

"2. After three minutes' immersion, out of a similar number 42 recovered, and 11 of these laid eggs after being fed.

"3. After four minutes' immersion, 8 seemed to recover, but soon died.

"4. After five minutes' immersion, none recovered."

These results do not differ from what has been known for a long time, the explanation of which is given by BACOT.

" 'Lice are not passive but active factors in process of immersion, protecting themselves against the entrance of fluids by closing the spiracles.'"

CHILD WELFARE.

FIGUEIRA (Fernandes). **Quelles sont les meilleures manières de protéger l'enfant de l'ouvrière employée dans l'industrie ou le commerce?**—*Bull. Internat. de la Protection de l'Enfance.* 1924. May 31. No. 26. pp. 490–498.

This paper deals with the treatment of mothers and children at the breast, both those who remain at home and those who work in factories in Brazil.

For the latter crèches are provided, in which only children of very tender age are accepted. The crèche consists of a room set apart for feeding the children, a school for mothers, and a register of the results of domiciliary visits of the health visitor. Samples of forms filled in for this are given in the paper, as also are the enactments establishing and regulating the crèche.

As regards the mother who remains at home, it is found that in Brazil about 35 per cent. prefer to abandon their employment if they have the necessary means. The mother then has recourse to dispensaries should necessity arise and is visited by the health visitor twice a month.

WOO (S. M.). **The Problem of School Hygiene in China.**—*Nat. Med. Jl. China.* 1924. Apr. Vol. 10. No. 2. pp. 98–100.

In discussing this subject the writer lays down the following principles: Concentrate (1) on health education and (2) on the young; (3) the centre of effort is the school. It is pointed out that there are many difficulties; doctors, nurses, dentists are required; money is very scarce.

REPORTS AND VITAL STATISTICS.

ACCRA. **Report of the Medical Officer of Health, Accra, for the Year 1922.** [SELWYN-CLARKE (P. S.), Medical Officer of Health.]—69 pp. With 20 figs. & 2 charts. 1923. London: Waterlow & Sons, Ltd., London Wall. [Price 4s.]

" The year 1922 was without example in the annals of the Council in the great achievements of the Council during the period. To name a few of these: the Council built model quarters for the Kroo labourers employed on conservancy work at Christiansborg; the Council completed and equipped a section of the New Market and had a further 17 well constructed stalls built on to the completed section; the Council converted the old offices of the African and Eastern Telegraph

Co., in Horse Road, into spacious new offices for the Council; the Council had the mule transport stables entirely re-roofed and put in an excellent condition of repair; the Council had model stables to house 20 mules and horses built on land adjoining its own stables for owners of horses who were not in a position financially to build sanitary stables in the municipality; and, lastly, the Council performed many other duties—inadequately dealt with in this report—in the interests of the health and well-being of the community, as, for example, passing legislation regarding latrines, ventilation of houses and the efficient working of markets.

"The writer ventures to hope that some, at least, of the recommendations he has embodied in this report may receive the support of yourself and the honourable members of the Council."

Evidently, from the above quotation, there is a great deal of sanitary improvement in progress in Accra.

Four cases of yellow fever occurred in the year under report, but anti-mosquito measures primarily directed against malaria have had a considerable influence on this disease. No case of cholera occurred. There were two cases of cerebro-spinal meningitis. Dysentery, diarrhoea and enteritis are very prevalent causes of death, over 14 per cent. of the deaths being recorded under this head. Amoebic dysentery appears to be common. The Medical Officer considers that little or nothing can be done until a more suitable and up-to-date method of sewage disposal is adopted. This he anticipates will be accomplished shortly. No plague occurred during the year. In six suspected cases of smallpox the diagnosis was doubtful. Tuberculosis is a frequent cause of death and would appear by a graph to be on the increase; but measures for its eradication are very difficult in such a primitive population, though every endeavour is being made.

"The following is a list of the chief desiderata as regards sanitary improvements in Accra:—

"1. Water-carriage system of sewage disposal—the feasibility of this is dependent to a large extent on the water supply to the town, and for this reason the present system of storing water will have to undergo some modification, possibly in the direction of substituting an up-to-date chlorination system and of increasing the capacity of the storage reservoirs.

"2. Provision of more latrines, dustbins, wash-houses, concrete drains and public standpipes.

"3. Relief of congested areas, including the provision of healthy dwellings.

"4. The tarring of all the main roads in the town.

"5. Provision of electric lighting. One of the difficulties encountered at present in the prosecution of the anti-tuberculosis campaign consists of the permanent nailing up of windows by house-owners in order to prevent the ingress of thieves. The members of this fraternity are less likely to operate in a well-lit town.

"6. Compulsory notification of Phthisis and Leprosy by all registered medical practitioners.

"7. Provision of at least two partly trained and subsidised midwives.

"8. Registration and Licensing of Schools.

"9. Registration and Licensing of Bakeries.

"10. Provision of a suitable site for the drying, curing and smoking of fish.

" 11. Provision of a school medical officer and a medical officer to organise an infant welfare clinic and pre-natal and post-natal clinic for prospective mothers.

" 12. Vigorous propaganda against venereal disease.

" 13. Inoculation against Enteric of officials coming to the Colony.

" 14. Provision of suitable quarters for officials to avoid the hardship and undesirable practice of ' doubling up '."

A health week, the main object of which was to clean up the whole town, has met with a very lively response from the people generally. The two illustrations (Figs. 62 and 63) give some idea of what the rubbish removal department had to face as a result.

GAMBIA, Colony of. **The Annual Medical and Sanitary Report for the Year 1923.** [ALLAN (K. B.), Acting Senior Medical Officer.]—43 pp. London: Crown Agents for the Colonies, 4 Millbank, S.W.1. [Price 5s.]

Dr. Frank A. INNES, M.O.H., writes as follows :—

" *Vital Statistics and Child Welfare.*—The year's returns do not entitle us to any marks for progress. The general death rate is 43·06; this gives an average for the quinquennium of 42·75 per mille.

" The birth rate is 26·65, being the lowest on record since 1900, when 23·5 was given as the figure. For the quinquennium it is 28·99. Deaths have outnumbered births by 157. This figure has been exceeded twice since 1901, viz., in 1920, when the excess deaths were 170, and in 1918 —the ' flu ' year—when they reached 289. Figures were given last year to show that only thrice in the last twenty-two years have births been more numerous than deaths, viz., 1909 by 10, 1916 by 10, and 1917 by 73. It may not be pleasing, but it is plausible, to liken the life of Bathurst to that of a cancer which, unable to maintain the vitality of its own cells, involves neighbouring ones in the common disaster. Bathurst cannot maintain its own life and it only continues its career by imported lives.

" *Infant mortality.*—The infant mortality rate is practically undiminished. The 1923 figure is 498, as against 502 last year; so it is still true that every second child dies within a year of birth. These rates must be considered, of course, in the light of the great drop in the 1923 birth rate, which makes the 498 theoretically worse. . . .

" *Lectures and school instruction.*—A course of public lectures on Hygiene in simple English is given annually by a Medical Officer. School children, teachers, and Public Health Inspectors are specially invited to attend. The last class roll numbered 69. In the examination at the close only 13 out of 45 gained the pass mark. Of course, hygiene is also a subject in the schools curriculum; and in the December examination 16 pupils were presented of whom 8 passed the examination.

" Now it is wise and right to prescribe and conduct such lectures and lessons, and to expect results from them. Meantime the elder people consider it all a ' stunt ' for school boys, they themselves being stimulated to antagonistic interest in hygiene only when the Inspector ' humbugs ' them by professing to find ' laavee ' in their wells and

FIGS. 62 and 63.—Two public dustbins *after* the usual loads of refuse had been removed on the first working day of the Accra Health Week, October 8th-14th, 1922.

[Reproduced from the *Report of the Medical Officer of Health, Accra, for the year 1922.*]

coolers—with the grossly unwelcome, and to them unfair, sequel of Court proceedings and a fine of 2s. 6d. upwards! It may be asked, how long this is to last, and whether remedy can be provided? We go on fining people for breaking the law, but we cannot claim that we offer much instruction to help them to keep it. Would it be impossible for Government to provide an educational lantern (electric light), with a suitable selection of scientific slides in tropical medicine and hygiene, a lecturer, and an interpreter, for a succession of public demonstration-lessons, so as to interest the people outside the boy and girl of school age? Such an effort to interest and educate the public in their own affairs of life and death would surely help to make civic and social wheels move more worthily and healthily, in contrast with our poor results from time and money expended in compelling and castigating this large community recalcitrant because ignorant!"

Boyd (J. J.). **Infantile Mortality in South Africa and New Zealand.**—*S. African Med. Rec.* 1924. July 26. Vol. 22. No. 14. pp. 321–330. With 3 charts.

The writer gives an interesting comparison between the infant mortality in the towns of New Zealand (where it is very low) and towns and districts of South Africa. It appears to have been claimed that the favourable results in New Zealand are largely due to the system of mothercraft started there by Dr. Truby King, and it has been contended that if that system were applied to South Africa the local figures would be considerably lowered. The writer, however, points out:—

"That New Zealand has at no time in its history experienced infantile mortality rates anything like as high as those which prevailed in South Africa up to the end of the nineteenth century.

"That the fall in the New Zealand rates since 1904 has been about 50 per cent., whilst the fall in the South African town rates has also been about 50 per cent. during the same period.

"That the fall in the New Zealand rate is largely due to other factors than the teaching of mothercraft, without denying the importance of such teaching.

"That the fall in certain towns and districts of South Africa is similarly largely due to other factors than the teaching of mothercraft.

"That several of the South African towns have already attained infant mortality rates which are little, if at all, inferior to the average New Zealand town.

"That it is in the small towns and villages of South Africa that infantile mortality is highest."

The following remedial measures are recommended by the author:—

"1. The establishment of local Health Authorities, either Town or District Councils, throughout the Union.

"2. The appointment of properly qualified whole-time Health Officers and Sanitary Inspectors for such areas, individually or for combinations of areas, and the appointment of Health Visitors for Child Welfare work.

"3. The education of the people, parents, school teachers, boys and girls in the principles of health and parental responsibility.

"4. The elimination of the native as far as possible from the care of European children.

"5. The annual publication by the Union Health Department of statistics regarding health and infantile welfare in the Union. The present form of report is much too meagre."

TANGANYIKA TERRITORY. **Annual Medical Report** [DAVEY (J. B.), P.M.O.]. **Annual Report of the Sanitation Branch of the Medical Department. Report of the Dar-es-Salaam Laboratory** [BUTLER (G. G.), **for the Year 1922.**—212 pp. With 8 charts & 1 map.

The annual report of this Territory is of great interest though the country is not yet highly developed. This can be seen from the following recommendations of the Principal Medical Officer :—

"1. An organised staff of sanitary officers for public health duties in the larger townships and on the railway lines. Better sanitary work will be done by officers who are assured against liability to recall to ordinary medical duties.

"2. Increase of the medical staff to provide (1) a district Medical Officer for each of the eighteen larger administrative districts ; (2) Medical Officers for special duties in connection with epidemic diseases —plague, sleeping sickness, yaws, venereal disease.

"3. The appointment of an Office Superintendent to the Principal Medical Officer's office where the volume of correspondence, much of it of a confidential nature, is very large. Proper records cannot be kept with the existing staff, and the amount of detail work required of the Administrative Officers is very large.

"4. Strengthening the staff of the Dar-es-Salaam Laboratory by the appointment of an Assistant Bacteriologist and a Medical Entomologist.

"5. The replacement of grass and wattle and daub hospital wards by permanent structures and the provision of the latter in stations for which it is proposed to provide Medical Officers when the Staff is augmented.

"6. The reduction of vegetation, notably cocoanut, palms and heavy foliaged trees, in towns on the coast and in other unhealthy places. The clearing of old cocoanut palms from the Botanical Gardens, Dar-es-Salaam, is a measure which has been urged both by the Medical and Agricultural Departments from different points of view. The Botanical Gardens, Dar-es-Salaam, should be cleared to such an extent as to render them of value as an open space instead of, as now, acting as a nursery of and refuge for mosquitoes and a screen cutting off the sea breeze from residences.

"7. Better facilities for the isolation of infectious disease in the principal settlements.

"8. Registration of births and deaths, in all classes, in all townships.

"9. The careful restriction of the number of returns required of members of the department specially on financial matters.

"10. Whenever funds are available, two-storied houses, in preference to bungalows, should be erected for officials in stations with trying climates, such as the coast towns.

"11. The appointment of a Building Inspector under the Dar-es-Salaam Township Authority.

"12. The appointment of a Surgeon Specialist for headquarters."

With reference to Dr. HOWARTH's investigation of cocoanut trees as breeding places for mosquitoes Dr. G. G. Butler writes :—

" As his investigation is not yet completed, I can only allude to his reports sent in from this laboratory.

	Palms examined.	Per cent. holding water.	Per cent. with larvae.
January	64	70·3	61·8
February	347	80·1	78·3
March	332	97·6	96·6
April	482	98·2	97·2
May	362	99·7	99·4
June	347	100	99·4
July	334	100	99·4
August	76	100	100

" Anophelines, Aëdes, Megarhinus and Culex are the main genera to which the mosquitoes belong.

" The importance of the observations that even the highest cocoanut tree may form breeding places for mosquitoes is obvious to all workers in similar districts in the tropics."

INDIA. **Annual Report of the Public Health Commissioner with the Government of India for 1920 with Appendices and Returns of Sickness and Mortality among European Troops, Indian Troops, and Prisoners in India for the Year.** [FRY (A. B.), Officiating Public Health Commissioner.]—pp. iv+135+xxix+149. With 7 charts. 1922. Calcutta : Supt. Govt. Printing, India. [Price 3 rupees 12 annas.]

General Population Infant Mortality figures.—" A study of the figures shows :

" Firstly, that, for all India, of 100 infants which fail to survive the first year of life, no less than 43 die in the first week.

" Secondly, that in practically all the provinces the total deaths of infants in the first week of life are greater than the total deaths in the succeeding three weeks.

" Thirdly, that the deaths in the five months from the beginning of the second to the end of the sixth are 50 per cent. more than those in the last six months of the year.

" It is not yet safe to enter into a detailed statistical analysis of these figures. A few more years' tabulation will be required to enable us to make out by the presence or absence of discrepancies how far these returns are reliable.

" The recording of a high rate of infantile mortality has always been a regrettable feature of these reports since statistics were first compiled.

" The causes are many ; the poverty of the vast bulk of the population, the custom of early marriage, and the general lack of sanitation in the homes of the people have been noted on frequently."

Midwifery in India.—" The malpractices of the dhai class . . . . may be summarised by saying that labour is never left alone ; frequent vaginal examinations with dirty hands, early rupture of membranes

before the *os uteri* is half dilated, and forcible pressure of the abdomen in the absence of pains, is the routine.

" Immediately the child is born the placenta is attacked. The unfortunate mother is often given an emetic. If the vomiting fails to expel the placenta it is removed by pulling on the cord or piecemeal by hand. The vagina is then packed with oiled wool. The placenta is buried at the head of the patient's bed in a shallow hole. In a small room with India's climate the resulting stench after a few days may be imagined.

" The child is maltreated even worse than the mother. The cord is cut with anything handy, and the most common thing to use for ligature is the hair-string from the mother's head, a greasy cord which she has worn for months. The usual tongue-tie operation is then performed. The most amazing thing is that the child is allowed no nourishment for three days but is kept quiet with opium. As may be imagined, this leads to marasmus in the child and great discomfort to the nursing mother.

" If labour is complicated by abnormal presentation or other accidents the dhai is completely helpless and unless rescued by someone with a knowledge of midwifery practice both mother and child commonly die."

Fever Death rate.—" United Provinces.—The Sanitary Commissioner, in accordance with the informal resolution of the Sanitary Commissioners Conference, improved his registration and has added to his tables a supplementary form showing division of the heading ' fevers.' His results are very interesting. Of a total number of fever deaths, viz., 1,442,376, he records—

Malarial fevers	1,010,614
Enteric fever	68,593
Measles	20,116
Relapsing fever	5,243
Kala-azar	4,666
Other fevers	333,144

" The Sanitary Commissioner conjectures that the ' other fevers ' heading includes the majority of kala-azar, enteric and relapsing fever.

" The mortality curve rose steadily to an apex in June and fell to its lowest point in August. This was followed by a second rise in September and October, when it is stated that malaria was more or less epidemic.

" A very vigorous quinine policy was pursued, both of free distribution and sale by numerous agencies, post offices, patwaris, landlords and vaccinators. Civil Surgeons reported relapsing fever from no less than thirteen districts. Influenza prevailed during the first half of the year, but was of a mild type, yet it may be presumed to be the cause of the rise of the mortality curve up to June. The estimated death rate from influenza is put down at 4·41 per mille. This figure is arrived at by calculating the excess total mortality of 1920 over the average for 1916, 1917 and 1919 as representing influenza deaths. This method can hardly be regarded as accurate except for enormous figures such as the seven million excess deaths ascribed to the influenza pandemic of 1918.

" The report on fevers is very full, and it is to be hoped that in future years all provincial Sanitary Commissioners will write a history of the chief fevers and a full analysis of this most interesting and important section of their narrative."

MADRAS. **Annual Report of the Health Officer of the City of Madras for the Year 1922.** [RAO (K. Raghavendra), Health Officer.]—120 pp. With 6 charts, 1 map & 1 plate. 1923. Madras: Printed by S. Murthy & Co. at the "Kapalee Press," 305 Thambu Chetty Street.

Population. 526,911.
Birth rate. 41·1 per 1,000 of the population.
Death rate. 42·7 per 1,000 of the population.
Infantile death rate. 308 per 1,000 children born.

Smallpox.—There were more than 1,000 deaths, which represents a death rate of 2·1 per 1,000 of the population. This figure exceeds that of malaria, which was 1·4, and other infectious diseases, 1·2. There was practically no plague. Dysentery and diarrhoea represents 7·9 deaths per 1,000 of the population, and respiratory disease 9·3.

The water supply of the city is still rather unsatisfactory. The slow sand filters are reported as not working well.

The writer points out that not only is the death rate amongst infants high, but 293 deaths occurred in childbirth amongst the mothers. Child welfare work still receives a large amount of attention, and it undoubtedly is extremely valuable in spite of the fact that there has been a slight rise in the infant mortality during the current year.

MADRAS. **Report on the Working of the King Institute of Preventive Medicine, Guindy, for the Official Year 1922-23.** (With Appendices.) [CUNNINGHAM (J.), Director.]—pp. 58+2. With 4 charts. 1924. Madras: Printed by the Supt., Govt. Press. [Price 1 rupee 12 annas.]

Vaccination.—2,079,915 doses of vaccine lymph were issued during the current year, an increase of over ¼ million. The new method, NEJLAND'S, with a minor modification, has been found extremely successful in Madras, and the seed lymph is kept up to suitable strength without any extraneous aid.

"The success rates for lanoline and glycerine lymphs taken separately are as follows:—

	Case.	Insertion.
Lanoline	77·1	48·4
Glycerine	89·7	73·6

"These rates are almost identical with those obtained last year and simply bear out the conclusions already expressed with regard to the relative merits of these two types of lymph. These figures once more show the desirability of discontinuing the routine issue of lanoline lymph as soon as possible in favour of glycerinated lymph. . . . .

"*Experiments as to the feasibility of purifying glycerinated lymph by the chloroform process.*— . . . . Taking the figures as a whole there is not much difference between the results obtained with the treated and untreated lymphs. . . . The case and insertion success rates for the untreated lymph (88·7 and 80·8) are slightly better than those of the samples exposed to the chloroform vapour (85·8 and 79·0). Further, the number of lymphs producing a case success rate of over 90 per cent. is distinctly greater in the untreated series although the insertion success rate is better in the case of the chloroformed lymph . . . . The reduction in the extraneous bacteria was always much more marked in the case of the treated samples. The number of bacteria per c.cm.

varied between 580 and countless for the untreated and 0·3 and 5·6 for the treated lymphs. The results of the experiments so far conducted would indicate that the chloroform process undoubtedly depreciates the potency of the lymph to some extent, especially if carried on sufficiently long to kill all bacteria present in the lymph. This vaccinicidal action is somewhat uncertain and is not fully under control, some batches of lymph giving evidence of very considerable destruction, others although subjected to the same treatment showing little or no degeneration."

Bacteriological Section.—" A test to the *B. paratyphosus* C has now been added as a routine to the usual tests performed with *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, and *Micrococcus melitensis*. Four hundred and fifty-six sera were returned as positive to one or other of typhoid group of organisms. The details of these cases are of some interest as giving an index of the relative frequency of infections with these organisms in Madras :—

258 cases were positive to *B. typhosus* alone,
9 cases were positive to *B. paratyphosus* A alone,
1 case was positive to *B. paratyphosus* A alone, and
5 cases were positive to *B. paratyphosus* C alone."

71 specimens for examination for dysentery bacilli were received. Specific organisms were found in 20 (Shiga 7, Flexner 12, Morgan's bacillus 1), and a large number of vaccine reactions were performed during the year.

A special feature of the year has been a large number of specimens received for diagnosis of relapsing fever ; spirochaetes were found from many parts in Madras, and it is thus evident that the disease was and is widely distributed over the Presidency.

Investigation Units.—" The following units were sent out from the Institute during the year under report :—

" 1. One unit to form a camp laboratory at Alipuram Jail.

" 2. One unit to investigate relapsing fever in Tanjore district.

" 3. One unit to investigate an outbreak of typhoid fever at St. George's Home, Kaity.

" 4. One unit to investigate an outbreak of cholera at the Central Jail, Coimbatore.

" 5. One unit to form a clearing bacteriological laboratory for the Mappilla prisoners at the Cannanore Central Jail.

" 6. One unit to investigate a severe outbreak of fever amongst officials belonging to the Forest Department at Olavakote."

The investigation of the Tanjore district showed that the sickness was largely due to relapsing fever. Investigation at Kaity had to be rather prematurely closed, sanitary recommendations being made. The unit at Coimbatore jail showed that the water in two wells was contaminated and cholera vibrios were found in the stools of one of the cooks ; appropriate measures brought the outbreak to an abrupt end.

SHANGHAI. **Shanghai Municipal Council Public Health Department. Report of the Commissioner of Public Health, 1923.** [DAVIS (C. Noel), Commissioner of Public Health.]—50 pp. With 1 chart & 1 illustration. 1924. Shanghai: Kelly & Walsh Ltd., 30, Ferry Road.

" There are few cities in the world so peculiarly situated as Shanghai, or so perilously exposed to visitations of epidemic disease. Smallpox,

cholera and typhus are all present at some time during the year, but it is eight years since the occurrence of the last case of human plague.

" By favour of fortune, and by ceaseless vigilance, these diseases have never become epidemic in the International Settlement, and the standard of the public health remains high. The past year was unusually healthy. The death rate among Foreigners was comparatively low, being 17·2 a thousand compared with 19·3 last year.

" Freedom from serious outbreak of communicable disease was especially gratifying in view of the unusual risks run on account of the great influx of refugees, epidemics of plague and smallpox in Hongkong and Canton, and the presence of plague in other Far Eastern ports, all in maritime communication with Shanghai.

" The largest number of deaths among Foreigners, as in previous years, was caused by the Respiratory and Alimentary Groups of Communicable Disease. Both were appreciably lower than last year.

" The heaviest mortality from the typhoid group of fevers and from pulmonary tuberculosis was among the Japanese, being 88 per cent. and 58 per cent. respectively of the whole.

" There were 27 deaths from the typhoid group and 9 from the dysenteries, compared with 46 and 14 last year.

" No deaths occurred from scarlet fever or from diphtheria.

" The death rate among the Chinese was 10·3 a thousand, compared with 11·7 last year, and is the lowest on record.

" It is not altogether a true index of the health of the Chinese within the Settlement, for when they suffer from chronic or incurable complaints, they usually leave the Settlement for their native homes and there await death. The mortality recorded, therefore, is chiefly due to accidents and acute disease.

" The death rate from communicable disease was 17·8 per cent. of the whole.

" The accuracy of vital statistics was increased by revising the nomenclature of recorded disease, and by the issue of a more comprehensive Death Certificate.

" Vaccination against smallpox was carried on with great vigour in view of the epidemic in Hongkong. Altogether 45,086 free vaccinations were done. Of these 40,828 were at the Branch Health Offices. The previous highest record was 33,962 in 1921. Eighty-one per cent. of the number were infants under one, and children under 15 years of age.

" The free Municipal Clinic for Venereal Diseases made a most successful start, and already hospital accommodation for In-patients has become necessary. Future developments will include a clinic for women and for Chinese. The venereal diseases are among the most easily preventable, but the problem is confused with ethical, social and religious considerations, and can only be solved if approached in a scientific spirit, with frankness and courage. . . .

" The problems of Public Health in Shanghai are daily growing more difficult and complicated. In some ways it is one of the most remarkable cities in the world, for none of its achievements in Public Health have been by compulsion, but all by educative tact and persuasion, and by the common-sense, goodwill and enlightened co-operation of the people.

" One of the most dangerous conditions favouring the spread of epidemic disease is that of overcrowding among the Chinese—a habit descended from ancient feudal times, when they herded together within walls, for defence against marauders.

"In one area north of the Soochow Creek the density of population is about 2,000 an acre, compared with an average of 152 an acre throughout the Settlement.

"It is greatly to the credit of Shanghai that so much has been achieved in the past with such small compulsory powers. Vaccination, for instance, is not compulsory, yet over a quarter of a million free vaccinations have been done within the last 20 years, with a great saving of life; but on account of the enormous growth and development of the city, and because the control and suppression of communicable and epidemic diseases depends fundamentally on accurate knowledge of their prevalence, and on power to deal promptly and efficiently with conditions that favour the spread of such diseases, the need becomes urgent for Public Health legislation dealing with:—

"1. Prevention of overcrowding.

"2. Compulsory registration of medical practitioners.

"3. Compulsory notification of communicable diseases and registration of deaths.

"4. Compulsory isolation of cases of communicable disease where means of isolation in the home are inadequate, or when such isolation is undesirable."

Water Supply.—"A systematic investigation, extending over 14 months, has shown that the processes employed at the Waterworks are capable of reducing the number of lactose-fermenting organisms of the *B. coli* group to 40 per litre at all seasons of the year, and, with rare exceptions, this standard has been maintained. It is a high standard, and the quality of the supply is most creditable to the Waterworks authorities. The water, however, has fallen short of this standard during three short periods in the year. One of these failures was definitely traced to leakage from a newly laid sewer, and the contamination was limited to a small area; on another occasion samples from widely separated hydrants were found to be badly contaminated at intervals during ten days. This was probably due to some failure of purification at the Works. These occasional lapses illustrate the importance of domestic treatment of the water by boiling or filtration through a properly kept germ-proof filter."

Li Ting-an. **The Death Rate of Hongkong as a Criterion of Mortality in China.**—*Nat. Med. Jl. China.* 1924. Feb. Vol. 10. No. 1. pp. 25–32. [2 refs.]

Summary.—"1. Attention is called to the necessity of standardizing the crude death rate, particularly that of a small city.

"2. The crude death rate of the Chinese in Hongkong in 1922 has been wrongly computed and reported by the Sanitary Department of Hongkong. The correct crude death rate is 22·01 per 1,000.

"3. The standardized death rate of the Chinese in Hongkong in 1922 is 27·57 per 1,000.

"4. The standardized death rate from all forms of tuberculosis of the Chinese in Hongkong in the year 1922 is 369·62 per 100,000 population.

"5. The infant death rate of the Chinese children in Hongkong in 1922 is 289·98 per 1,000.

" 6. It is reasonable to assume, in lack of other data, that the figures computed for Hongkong indicate approximately the rates of mortality that will be found for South China, when accurate statistics become available, except for years of large epidemics."

Standardized Death Rate for Hongkong in the year 1922.

Age Group.	Percentage age distribution of population of Hongkong in 1922.	Number of persons in Hongkong alive in middle of 1922.	Total Deaths in age groups.	Specific age death rate per 1,000.	Standard million of England and Wales in 1901.	Death rate standard million if the Hongkong death rates were used.
0–5	8·16%	52,795	6,383	120·90	114,262	13,814
5–15	16·10%	104,167	1,080	10·37	209,944	2,177
15–25	25·10%	162,397	1,139	7·01	195,742	1,358
25–45	37·60%	243,272	2,624	10·78	284,428	3,066
45–	12·70%	82,169	3,006	36·58	195,624	7,156
Total		644,800			1,000,000	27,571

WINSLOW (C. E. A.) & KOH (Z. W.). **The Mortality of the Chinese in the United States, Hawaii and the Philippines.**— *Amer. Jl. Hyg.* 1924. July. Vol. 4. No. 4. pp. 330–355. With 11 charts.

" 1. The crude death rate of the Chinese in the United States is very high (27·1 per 1,000, for the States of California, Oregon and Washington in 1919–1920, as against 12·4 for the total population of these States).

" 2. This excessive mortality is in large part due to the abnormal age distribution of the Chinese in the United States. Standardization, on the basis of the standard million of England and Wales in 1901, reduces the Chinese rate to 20·0 and the total rate for the entire population of the three States to 11·4.

" 3. In the city of Manila the crude mortality for the Chinese is much lower than in the United States, and in Hawaii it is lower still. The comparative figures for 1920 are: Registration States, 24·3; Manila, 18·4; Hawaii, 16·9. In both Manila and Hawaii the Chinese rates are intermediate between those for Caucasians and those for the native races (Hawaiian and Filipino).

" 4. Standardization reduces the Chinese death rate in Hawaii for 1919–1920 from 15·8 to 15·3, while it increases the rate for Caucasians from 12·5 to 13·2, leaving a relatively small difference between the two race stocks.

" 5. Analysis of deaths by cause indicates that the Chinese in all three regions studied exhibit a consistent and apparently characteristic excessive mortality from tuberculosis, from circulatory disease, and from genito-urinary diseases, as compared with Caucasians. It would appear that so far as these diseases are concerned inherent physical characteristics or racial habits must exert a specific predisposing influence. The excessive mortality from acute respiratory diseases and from external diseases which appear among the Chinese in the coast States are, on the other hand, apparently due to local climatic or social and environmental conditions or to the particular type of Chinese represented in the United States, since death rates from these causes are not excessive in Hawaii or in Manila."

SIAM. **Report of the Department of Public Health** [H.R.H. The Prince of Jainad, Director-General]. **Including the Report of the Office of the Medical Officer of Health, Bangkok.** [MENDELSON (R. W.), M.O.H., Bangkok.]—1922. (B.E. 2465.) Nov. pp. vi+169. With 14 diagrams & 57 tables.

In a recent number of the Sanitation Supplements it was stated that the Siamese Red Cross Society took the place of the Government Public Health organization of other countries. This is not correct; although it is true that the Red Cross Society, in conjunction with the International Health Board, started and maintained a hookworm survey and has assisted the Health Department very materially in many ways, it is none the less a fact that there is a highly organized public health service, the Annual Report of which we have recently received.*

In Chapter 6 of this volume is given a detailed account of the Organization. It comprises a Director-General, a Director, Secretaries, a health education department, an engineering section, and several physicians and Government doctors scattered over the country. Some of these fulfil the double duty of attention to the sick and to public health works.

The hookworm survey before mentioned has now been handed over to the Department of Public Health. The arrangements of the Department seem to be extremely up to date; there are not many countries in the East that, to save time in an emergency, deliver their vaccine lymph by aeroplane. This has occurred in Siam.

As regards statistics, there is apparently much yet to be done in the way of correct collection and tabulation. The infant mortality is put down as about 300 per 1,000 children born, due, the writer says, to ignorance and lack of suitable care of infants. It would appear also that a very large number of women die in childbirth, owing to the same causes and a deficiency in trained midwives. A disease known as "sang," which appears, from the scanty description given, closely to resemble infantile liver, common in some parts of India, accounts for a very large number of deaths amongst babies.

Smallpox is fairly common in the country and occurs periodically every 3 or 4 years, in the months of December, January and February. It is, however, greatly reduced compared with former times, owing to vaccination; there is a laboratory for vaccine manufacture. The writer says that the aim should be to vaccinate one million people per annum. At present, in the most favourable year, they have succeeded in doing half a million, but recently it was about 200,000.

As regard plague, the difficulties are those described in the Dutch East Indies, namely, that bamboos become the nests of rats and the grain markets are highly infested with these pests. *Xenopsylla cheopis* is common on rats.

Of cholera in the year under report there were 18,000 cases, with 13,000 deaths. Such data as are available point to river and canals as the greatest source of danger. Pollution of these by latrines on the banks is frequent. Amoebic dysentery and hookworm are both very common diseases; figures are not given. Malaria is one of the most important causes of death; Government facilitates the distribution

* H.R.H. the Prince of Jainad, Director-General of the Department of Public Health, writes: "Although the Red Cross Society has given material aid in the public health of this country, the Department of Public Health differs in no essential principle from similar Government organizations in other countries."

of quinine during severe outbreaks. Blackwater fever is not prevalent but occurs occasionally in the North Division. 80,000 deaths from influenza took place in 1918; business was at a standstill; schools and Government offices had to be closed.

As regards the Medical service of the country. "There are in Siam approximately 500 physicians who have passed an examination recognized by the state, and received certificates to that effect, and hence may be classified as qualified. Of these there are approximately 50 who have been scientifically trained in accordance with European standards. If we estimate the total number of persons practising the art of healing in one form or another to be approximately 10,000, that is 1 per 1,000 of the population, a very conservative estimate, it will be seen the proportion of qualified men to unqualified, and also comparative to the total requirements of the Kingdom, is practically negligible."

Sison (Agerico B. M.). [In English & Spanish.] **Causes of Death in the Medical Wards of the Philippine General Hospital. A Comparative Study. Las causes de muerte en las salas de medicina en el hospital general de Filipinas. Un estudio comparativo.**—*Jl. Philippine Islands Med. Assoc.* 1924. Mar. Vol. 4. No. 3. In English pp. 87–89. In Spanish pp. 111–112. [3 refs.]

This paper contains an account of the causes of death amongst the patients of the Philippine General Hospital. They are tabled below. The chief feature is the extraordinarily large percentage of mortality for typhoid fever :—

	1920.	1921.	1922.
Typhoid fever	50	36	58
Lobar pneumonia	29	19	17
Nephritis	17	16	11
Cardiac decompensation	23	6	21
Meningitis	13	13	4
Tuberculosis	14	10	10
Cerebral hemorrhage	11	14	7
Bronchopneumonia	10	6	6
Encephalitis	—	—	6

Comparison by Percentage.

	1920.	1921.	1922.
Total typhoid cases	118	210	226
Deaths due to typhoid	50	36	58
Total number of deaths	184	151	164
Typhoid mortality per cent.	23·8	30·5	25·59
Typhoid mortality as compared to the total number of deaths	27·12	23·8	35·4

Mededeelingen van den Burgerlijken Geneeskundigen Dienst in Nederlandsch-Indië. 1923. Part 4. pp. 327–455. With 5 charts.—**Annual Report of the Civil Medical Service for the Year 1921.**

Vital Statistics.

Causes of death, most prevalent diseases. Europeans.—"Diseases of the respiratory organs (not including tuberculosis) and diseases of the digestive organs (dysentery not included) stand easily at the top of the list as a cause of death.

" Malaria takes, as such, a second place, except in Semarang, where the mortality due to this disease is very considerable.

" Typhus abdominalis stands at about the same height as malaria : this is much too high. Contrary to assertions more than once proclaimed formerly, tuberculosis assumes an important place amongst the cause of death.

" Cancer also participates to a considerable extent. It might serve as a comparison to state that, in a similar statistical compilation for Holland, which appeared in Saltet's " Voordrachten over Gezondheidsleer," and which extended over the years 1907 to 1918 inclusive, tuberculosis is shewn as 11·7 and cancer as 7·6." [Here tuberculosis is 7·7 to 8·7 ; cancer 3·4 to 5·2.]

Laboratory work (Chemistry).—" The investigation into Korintji rice shewed that the vitamin-content of this rice which had been stored up for more than 100 years had not diminished to any important degree."

Prophylactic vaccine.—" Owing to the fact that in 1 c.c. of mixed cholera-typhoid-vaccine there are present just as many cholera and typhoid germs as in 1 c.c. cholera vaccine plus 1 c.c. typhoid vaccine, it appears that in 1921 the total vaccine, equal to the usual cholera vaccine, that was dispatched amounted to a total of 842,089 c.c. cholera vaccine." The amount of mixed vaccine issued was sufficient for 249,973 people."

Cholera.—" Cholera did practically not appear in the Archipelago during the year under review."

Smallpox.—" Gradually but regularly the number of cases of smallpox is decreasing in the Archipelago."

Plague.—" The total number of victims amounted to 9,727 (among which 520 cases of pneumonic plague). Of this number 1,987 died in the division of Salatiga, 2,912 in Magelang, 2,735 in Bojolali, with 225, 186 and 81 cases of pneumonic plague. In the division of Pasuruan of the 103 cases 69 were pneumonic plague. At the present moment the centres of the plague are principally found in the highlands of the three divisions first mentioned. From Salatiga outwards the disease shews an inclination to spread out in the direction of Pelantungan (division of Kendal) and Bawang (division of Batang)."

Typhus abdominalis.—" The number of cases reported in Java and Madura amounted to 937, with 160 deaths, giving a mortality of 17·1 per cent."

Influenza.—" Influenza still continues to claim its victims, almost everywhere in the Archipelago, and here and there it even appeared in serious epidemics, as in the 2nd quarter in the district of Tasikmalaya, with 2,282 cases with 350 deaths, mortality 15·8 per cent., and in one village even as high as 35·1 per cent."

Framboesia.—" A systematic extension of the campaign against framboesia amongst the population was carried out in the course of the year throughout almost the whole of the Archipelago. . . .

" The total number of people treated can certainly be estimated at from 250,000 to 300,000, when we take into consideration the fact that in the medical departments of West Java and Mid Java 60,000 and 133,500 people were treated, and in the Government of Celebes

39,914. The principle of payment, wherever possible, for the remedy, was kept up everywhere. In this way it was made possible at the same time to provide this inestimable treatment for the population, without any extra cost worthy of the name."

Malaria. " In 1919 the irrigation ordinance was introduced into the Tjihea plain ; from that time forward the plain was divided into two halves, which were provided with water about 6 months each in turn and then allowed to lie dry. Before an area was supplied with water, all the tertiary water channels were renewed and cleaned, so that from the very commencement *M. aconita* had no opportunity to lodge themselves in the ditches. During the planting of rice the tertiary channels are continuously kept clean. The Tjihea plain is now not only more healthy, but has also become more productive and available for dry planting (second crop), which up till then was not the case."

Amoebic dysentery, bacillary dysentery.—" The making of simple, efficient, latrines by means of boreholes in the ground was continued in various places in the medical department of West Java."

QUEENSLAND. **Annual Report of the Commissioner of Public Health to 30th June, 1922.** [MOORE (J. I.), Commissioner of Public Health.]—24 pp. 1922. Brisbane : Anthony James Cumming, Govt. Printer. [Price 9d.]

Estimated population (1921) 764,665 ; crude birth rate 26·59 ; death rate 9·34 ; infantile mortality 54·1 per 1,000 births.

Plague.—" The number of cases in humans in the Metropolitan Area amounted to 57, of which 28 proved fatal, whilst from outside centres 57 cases were reported with 36 deaths, making a total throughout the State of 114 cases and 64 deaths.

" The death rate in Brisbane was 49·12 per cent., but as three cases occurred amongst Chinese, who all succumbed, the corrected rate for whites is therefore 46·29 per cent. The death rate outside of the Metropolitan area was 63·1 per cent."

The majority of cases occurred in the months of October-December, but a few cases were reported in August, September, January and March. Infection is attributed to ship rats, but whether from Australia or outside is a matter of conjecture. The first infected rat was caught on 31st August ; subsequently 116,476 rodents were destroyed, of which 109,798 were examined and 186 found infected.

Sentinel guineapigs were placed in 56 premises from which infected rats had been captured ; altogether 10 of these—from 5 several premises —died of plague. The fleas collected from 57 rats and 6 sentinel guineapigs were 176 *Xenopsylla cheopis*, 6 *Ctenocephalus felis*, 8 *C. canis*, and 1 *Ceratophyllus fasciatus*.

Typhoid.—" There may be mentioned one interesting series of cases which occurred in the Brisbane General Hospital amongst the staff of the hospital. Two medical men and four nurses contracted the disease whilst nursing surgical cases. It was found on investigation that two male surgical cases under treatment for surgical conditions were typhoid carriers and caused the outbreak. These two patients subsequently gave negative results, and no further cases amongst the staff occurred."

PANAMA CANAL ZONE. **Report of the Health Department of the Panama Canal for the Calendar Year 1922.** [FISHER (H. C.), Chief Health Officer.]—120 pp. With 7 plates & 6 charts. 1923. Mount Hope, C.Z. : The Panama Canal Press.

Vital Statistics.

Employees.—" The 5 diseases causing the highest number of hospital admissions, with their rates, were as follows :—

	1921.		1922.	
	Admissions.	Rate.	Admissions.	Rate.
Venereal Diseases	310	21·54	191	18·28
Malaria	214	14·94	176	16·85
Diseases of the eyes and their annexa	104	7·23	60	5·74
Tuberculosis (various organs) ...	38	2·64	34	3·25
Nephritis (chronic and acute) ...	25	1·74	28	2·68

" The 5 diseases causing the highest number of deaths, with their rates, were as follows :—

	1921.		1922.	
	Deaths.	Rate.	Deaths.	Rate.
Tuberculosis (various organs) ...	11	0·76	12	1·15
Organic diseases of the heart ...	14	·97	9	·86
Cerebral hemorrhage (apoplexy) ...	6	·42	6	·57
Cancer (various organs) ...	4	·28	6	·57
Nephritis (acute and chronic) ...	9	·63	4	·38

Sanitation.—" A large increase in the number of cases of malaria among non-employees is shown, and this was expected and predicted as

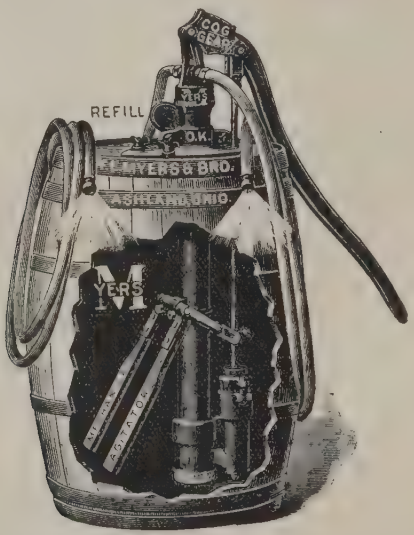

FIG. 64.—Barrel pump used for spraying heated oil from boat. The heated oil makes a fine misty spray which films well, even among the vegetation, when it falls upon the water.

[Reproduced from the *Report of the Health Department of the Panama Canal for 1922.*]

a result of the new policy of allowing unemployed labourers to return to the Zone to take up land for agricultural purposes. As explained in last year's report, it is impracticable to attempt to sanitate the country in which these settlers live. They are widely scattered over the available parts of the Zone, living in rude shacks near water courses and the lake, and are at all times exposed to malarial infection. About

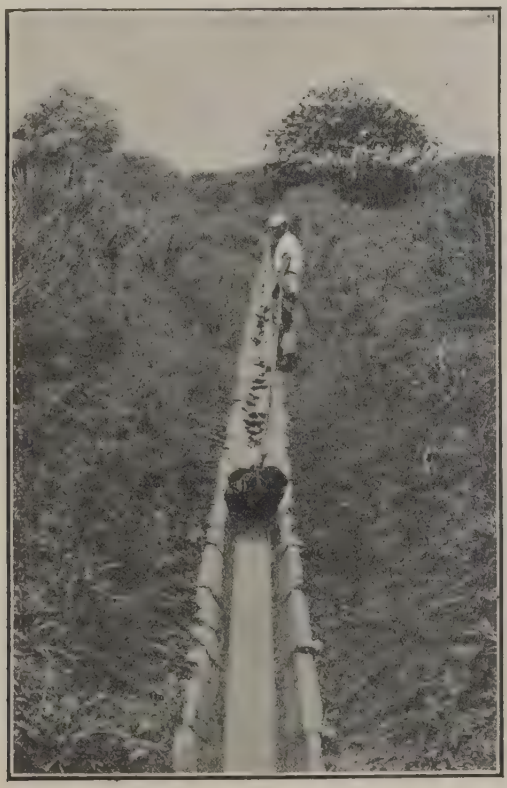

FIG. 65.—Oil-soaked mop, made from strands of old rope, dragged through open ditches, earthern or concrete, sweeps out small debris and algae, dislodges mosquito larvae, and leaves a good film of oil on the water.

[Reproduced from the *Report of the Health Department of the Panama Canal for 1922.*]

1,500 licenses have been granted these settlers, and it is estimated that 650 families are now living on the land. Each home inspected has been found to have a pit privy, not covered nor water-tight, but at least limiting the chances of intestinal infection. Many have learned to boil their drinking water and a few are undertaking drainage. Aside from malarial infection, the venture seems surprisingly successful in most instances. Ground has been cleared rapidly, and already many

of the settlers have achieved what appears to be economic independence, at least of their standards, and are rearing their families in contentment. They will be, perhaps, in better circumstances than similar agriculturists in Panamanian territory. . . .

"Screening, though expensive, is still a vital element of defence against malaria in the Canal Zone. Even in Ancon and Balboa, which

FIG. 66.—Double-ended oiling mop, made from strands of old rope. In oiling a narrow ditch the mop is dragged with one end following the other. In wider ditches the ends lie side by side. In streams the mop is dragged up one side and down the other. It is very efficacious and is economical of oil and labour.

[Reproduced from the *Report of the Health Department of the Panama Canal for 1922.*]

are least exposed to anopheles flights, a dangerous condition would probably result if without screens during certain season of rainfall, from anopheles bred more than a mile away. . . .

"The preliminary heating of oil to facilitate its passage through the piping and nozzles of spray pumps, without the use of 'larvacide' or

other diluting substance, has thoroughly demonstrated its practicability and economy. A particularly efficient type of pump has contributed much to its success. The one used is strongly constructed of cast iron, with brass plunger and valves. A geared handle and an ample air chamber in the stand permit of easy operation and a continuous fine spray of oil. [Fig. 64.] The drag or mop, made of strands of rope, used in cleaning and oiling open earth and concrete ditches, has also, after extended use, proven efficacious and saves greatly in time, labour, oil and cost. Earthen ditches so oiled require less frequent cleaning of vegetation from the sides and bottom. In fact, a certain amount of growth seems to add to its effectiveness, as the oil is retained on the stalks and leaves, to be given off as an effective film for some days following its application. [Figs. 65 and 66.]

Gonzaga (Gavião). **O problema das endemias ruraes no Ceará.**—*Brazil Medico.* 1924. June 21. Year 38. Vol. 1. No. 25. pp, 352–357.

The State of Ceará is divisible into three distinct zones:—(1) Littoral, cool and moist, with a mean temperature of 26°C. and a relative humidity of 77 per cent.; (2) Hilly, with a mean temperature of 20·7°C. and a relative humidity 85 per cent.; Inland, dry and hot, with a mean temperature of 27·6°C. and relative humidity 63 per cent. The prevailing diseases are trachoma, yaws, tuberculosis, leprosy, malaria, syphilis and plague. Ocular affections, of which trachoma is the chief, are common and are probably spread by the enormous numbers of flies infesting those with sore eyes. Yaws is prevalent in various localities, some showing 25 per cent., others as high an incidence as 80 per cent. The main focus of tuberculosis is Fortaleza, whence the disease is said to have spread to all the towns in the interior. Yellow fever first appeared in 1851, also in Fortaleza, and during the ensuing 25 years epidemics were frequent in different districts. For the next 30 years there was a lull, but in 1907 the disease reappeared in Quixadá. Notification was not carried out till 1922, so that reliable statistics are not available, and in 1923 the Rockefeller Foundation took matters in hand. The first case of leprosy was notified in 1868; recently in the Department of Leprosy and Venereal Diseases there have been recorded 140 cases in the capital and 250 in the various towns in the interior of the State. Plague is not a great scourge. Helminthiasis, in particular ankylostomiasis, is not regarded as an important sanitary problem, although the incidence varies from 32 per cent. in the inland to 54 per cent. in the hilly districts. Syphilis is rife and treatment is not thorough, because of the fear of injections, the cost, and because the patients cease attendance before cure is complete. Sanitary problems are not easy of solution in Ceará, on account of the large number of small foci of disease, the poverty and want of education of the majority of the inhabitants, and because means of communication are bad.*

United Fruit Company. **Medical Department. Twelfth Annual Report. 1923.** [Deeks (William E.), General Manager.]—180 pp. With 1 map. 1924. Boston, Massachusetts: General Offices.

The annual medical report of the United Fruit Co. in America for the year 1923 is, as usual, an extremely interesting and important

* Summarized by Dr. H. Harold Scott.

document. The summary of the work done, which is given below, affords some idea of the activities covered by this Company.

"As will be seen in the Table of Vital Statistics—

28,398 cases were treated in the hospitals.
227,545 treatments were given in the dispensaries.
10,170 cases were treated on the steam ships.
4,282 cases were treated by the Port Medical Officers.
1,406 candidates were examined for employment, of whom 99 were rejected.
100 steam ships were fumigated throughout, and, in addition, the holds of 3 steam ships and 51 separate rooms or quarters."

The average case incidence of the last four years is given below per 1,000 of the population. Malaria worked out at 20·5 per 1,000 employees, death rate at 2·1 per 1,000 employees, and 10 deaths per 1,000 cases.

Average 1920–1923.	Hospital cases per 1,000 Employees.	Deaths per 1,000 Employees.	Deaths per 1,000 cases.
Anchylostomiasis	23·60	·022	·9
Dysentery	13·6	·99	73
Influenza	15·3	·40	26·0
Pneumonia	11·20	4·59	408
Tuberculosis	5·92	1·77	299

No. of Employees.	No. of cases.	Deaths.	Deaths per 100 cases.	Deaths per 1,000 Employees.	Cases per 1,000 Employees.
44,625	21,642	706	3·26	15·82	484·97

There is a good deal of very interesting matter concerning treatment in various parts of the world which we regret that space prevents us from describing in detail.

"It is noteworthy that the rates of morbidity and mortality from the various diseases during 1923 approximated very closely the morbidity and mortality rates observed during the period covering the preceding nine years.

"Pneumonia was responsible for 22 per cent. of the deaths during 1923, and 20 per cent. of the deaths during the preceding nine-year period.

"Malaria also played an important rôle in the mortality rate; it was responsible for 13 or 14 per cent. of the deaths during each period.

"Tuberculosis caused 9 per cent. of the deaths in each period.

"Dysentery was responsible for more than 7 per cent. of the deaths in 1923, and approximately 4 per cent. of the deaths during the nine-year period. The exceptionally high rate in 1923 is explained elsewhere in this report.

"Organic diseases of the heart caused 5 per cent. of the deaths in each period.

"Nephritis caused more than 5 per cent. of the deaths in 1923, and more than 7 per cent. in the nine-year period.

"External causes were responsible for 7 or 8 per cent. of the deaths in each period."

PALESTINE. **Annual Report of the Department of Health for the Year 1922.**—89 pp. [MS. Report.]

Census returns from October 1922, 649,048 (the corrected figure).
Birth rate, 42·39 per 1,000 of the population.
Death rate, 18·75 per 1,000 of the population.
Infant mortality, 205 per 1,000 children born in the towns and 135 in the districts.

Infectious Diseases.—

Rabies is fairly common in the country; 423 patients were treated with vaccine for bites of animals.

A small epidemic of plague (63 cases with 19 deaths) broke out in July, and continued in August, September and October, dead rats being observed in an unsanitary part of the town.

Smallpox, 158 cases with 16 deaths, occurred in the month of December; 207,289 vaccinations and re-vaccinations were carried out throughout the country as a whole.

26 cases of typhus fever occurred in the town of Jaffa, which was probably infected through immigrants from Eastern Europe.

25 cases of relapsing fever were noticed, 5 of which occurred in Jaffa and 8 in Haifa.

208 cases of typhoid, with 32 deaths, were reported throughout the country, October being the month when it was most prevalent; 63 cases of paratyphoid were also reported.

129 cases of dysentery were notified, mostly from the towns.

No cholera, dengue, filariasis, beriberi or leishmaniasis were reported during the year.

A large amount of work was done in the laboratory. Some 3,000 slides were examined for malaria parasites. The results have shown that speaking generally the incidence of the benign tertian form reaches its maximum in August, its minimum in January; that of the malignant tertian form its maximum in October-November and minimum in March. 61 cases of quartan have been diagnosed; 24 originated in the Tiberias area.

MISCELLANEOUS.

SPILLANE (J. C.). **Memorandum on the Centralisation of Estate Hospitals in Sumatra.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. June 19. Vol. 18. No. 3. pp. 117–120.

It is well known to many Medical Officers in the tropics that in Sumatra and the Dutch East Indies there is a most excellent system of medical arrangements for the labour on Rubber Estates. The writer in an extremely interesting paper describes these in some detail. He points out the great improvement that has taken place within the last 30 years. Hospitals are divided in 3 classes:—

"1. *Private.*—That is, companies employing 10,000 or more coolies have one or more central hospitals of their own.

"2. *Syndical.*—A group of smaller companies, aggregating 10,000 coolies, have a central hospital, on the committee of which all estates are represented.

"3. *Contributory.*—The hospital is built by private funds, and surrounding estates contribute so much for the services of the doctor and so much per day for each coolie in hospital.

"Combinations of 1 and 3, also 2 and 3 occur."

As regards working details, the economical unit is 10,000 coolies and 100 to 150 Europeans. Every indentured coolie is very carefully looked over at a specially constructed sort of quarantine arrival station, is weighed, treated for any disease that he may have, and is inoculated against typhoid and cholera. Patients admitted to hospital are very carefully examined and a record of weight, anæmia, new infections, etc., is made. Disease is localized by showing the gang in which the coolies work and the barrack from which they come by the use of coloured flags on a map. At the end of each month a report is issued giving the following points :—

"(*a*) The sick rate per cent. ; (*b*) mortality ; (*c*) number of sick days in relation to working days ; (*d*) infant mortality ; (*e*) prevalence of special diseases affecting the health of the estate; (*f*) cost of upkeep per coolie per day."

Monthly visits of a sanitary officer to European residences and the barracks are also a feature of the scheme. Minor ailments and small accidents are treated at local dressing stations ; no patient is allowed to be sick longer than 2 days at these places. There is also welfare work amongst the women and children and maternity wards, etc.

"The working costs of such a hospital—serving 10,000 to 11,000 coolies and their families ; including the doctor and his transport ; one European assistant (non-qualified) for the books, records and administrative work ; medicines ; wages of sixteen to eighteen native assistants ; hospital clothing and feeding ; small repairs and renewals ; contribution to central laboratory, insurance and telephones—is 60,000 guilders, or $43,000·00 : a little over $4.00 per coolie per annum. Under this estimate a liberal allowance is made for everything for a normal sick rate, and with economy it could be less, certainly not more. Under this estimate is included the upkeep of a small European hospital with male and female wards. Europeans pay for their own maintenance while in hospital $5.00 a day."

Appleton (V. B.). **The Health Center Movement in China.**—*Nat. Med. Jl. China.* 1923. Dec. Vol. 9. No. 4. pp. 284–286.

The writer gives a description of what is commonly known as the " health centre movement in China." The Health Centre as constituted in China appears to be an institution which combines the uses of a propaganda centre and an infant and maternity and child welfare centre. Patients are not treated, so that it is hardly correct to describe it as a dispensary. Vaccination is carried out by the Officer in Charge and everything connected with improvement of the public health receives a large amount of attention. Periodical examination takes place of the children of the district ; mothers are instructed in feeding of their babies, etc. It is hoped to employ special nurses to follow up

in the home the work started at the clinic. The so-called waiting room is really nothing more nor less than an exhibition. The method of teaching avoids lectures as far as possible and makes use of demonstrations and conversations with the patients while they are waiting.

WANG (K. Chimin). **Some Experiences in Public Health Work at Hangchow.**—*Nat. Med. Jl. China.* 1924. Apr. Vol. 10. No. 2. pp. 80–88.

This paper contains an account of the difficulties of health work in China, which, however, do not differ very much from many other parts of the East. Thus the Celestial does not approve of killing dogs, rats and fleas, any more than the Buddhists in Ceylon and parts of India. The author indicates the extreme importance of the dog problem in many parts of China. Dogs not infrequently contract rabies and have been known to attack adults and children. As the writer says, one can ill-treat them, starve them and even torture them, but may not rid a community of their unwelcome presence.

Among methods recommended by the writer are anti-fly campaigns, which are certainly novel. The small children are provided with swatters and the dead flies are paid for at so much a hundred. Even this arrangement was stopped by religious prejudices. Other methods of propaganda were baby campaigns, mothers' clubs, child welfare clinics, school health work, and exhibitions.

DUNN (C. N.). **The Provision of Whole Time District Health Personnel in the United Provinces.**—*Indian Med. Gaz.* 1924. June. Vol. 59. No. 6. pp. 310–312.

The writer gives in very great detail an account of the conditions of service of three permanent Health Officers in the district of Gorakpur, Basti and Azamgarh, in the United Provinces. The duties of these officers are similar to those of Health Officers all over the world. They are termed District Medical Officers, and are paid at the rate of Rs. 350–50–700 ; for a second class officer the pay is Rs. 200–20–400 ; for a Sanitary Inspector Rs. 70–3–100. (It may, however, be pointed out that Government pay two-thirds of the cost and the District Board the remaining one-third.) All these districts are very populous and are frequently attacked with cholera and plague.

The staff at present is as follows :—

" (a) Gorakpur District. (Six tahsils).—Two district medical officers of health, with a staff of two assistant district medical officers, five sanitary inspectors, two clerks, four peons, travelling allowances and contingencies—Rs. 27,708 per annum.

" (b) Basti district. (Five tahsils).—One district medical officer of health, with a staff of one assistant district medical officer, three sanitary inspectors, one clerk and three peons, with travelling allowances, contingencies, etc.—Rs. 18,000 per annum.

" (c) Azamgarh District. (Six tahsils).—One district medical officer of health, with a staff of one assistant district medical officer, six sanitary inspectors, one clerk, two peons, with travelling allowances, contingencies, etc.—Rs. 17,514 per annum."

Philippine Islands [In English and Spanish.] **Items of Information regarding the Office of the Public Welfare Commissioner.**—10 pp. With 2 plates of illustrations. Manila: 700 Avenida Rizal.

The Public Welfare Commissioner of the Philippines has published a small pamphlet dealing with the activities of his office in relation to the general welfare of the community, and more particularly to maternity hygiene and child welfare, in the Philippine Islands. The office consists of (1) a Maternity and Child Welfare Division, concerned with the organization and working of maternity and puericulture centres, training of nurses and midwives, etc.; (2) a Dependent Children Division, charged with the care and education of orphaned and needy children and of defective and delinquent children; (3) a General Welfare Division, which promotes the public welfare by propaganda, by the study of community problems, and by co-ordinating, regulating, and assisting Government and private social service agencies; and (4) an Administrative Division, which concerns itself with disbursements, control of properties, the collection and distribution of supplies, etc., and supervises the accounts of charitable organizations in receipt of Government aid. The total personnel in 1922 was 157, and the cost of the office was p. 620,682.90 representing a per capita cost of .0549.*

Levine (Max) & Linton (Clair S.). **Differentiation of Human and Soil Strains of the Aerogenes Section of the Colon Group.**—*Amer. Jl. Public Health.* 1924. Feb. Vol. 14. No. 2. pp. 95–99. With 2 figs. [6 refs.]

Summary.

"A collection of 123 cultures of the aerogenes section of the colon group, comprising 47 strains isolated from human dejecta, and 76 strains from soil, were studied as to their morphological, cultural and biochemical characters.

"Two distinct types were evident when sub-division was made on glycerol fermentation, motility or gelatin liquefaction: (1) a group which is considered as the cloacae type (comprising 36 strains) did not ferment glycerol, was actively motile, and practically always liquefied gelatin; other carbohydrates (particularly the alcohols) were very rarely attacked; (2) a group which is representative of the aerogenes type of organism (comprising 78 strains) which attacked glycerol vigorously, did not liquefy gelatin, and was non-motile; other carbohydrates were frequently attacked. Besides these two main types, 9 cultures, which were intermediate in their characters, but which may be mixtures rather than a distinct type, were encountered.

"Adonitol non-fermenting strains of the aerogenes type were found only in the soil.

"Of the adonitol positive strains of the aerogenes type, which included 23 from soil and 44 from human sources, the soil and human strains could be differentiated in all but 3 instances on the following characters: melezitose, inulin, glycogen and dulcitol fermentation, and the production of indol.

"In the cloacae group, 4 strains of soil origin did not ferment sucrose, thereby resembling *B. levans*. In the remaining 32 strains there are included 3 of human origin which differed from the others in their more rapid fermentation of lactose and the appearance of their colonies on eosine methylene blue agar."

* One Philippine peso=50 cents U.S. currency.

REVIEWS AND NOTICES.

NEWSHOLME (Arthur). [K.C.B., M.D., F.R.C.P. Formerly Principal Medical Officer, Local Government Board, London; Lecturer on Public Health Administration at the School of Hygiene & Public Health, Johns Hopkins University, U.S.A.] **Elements of Vital Statistics in their Bearing on Social and Public Health Problems.**—623 pp. With 96 text figs. New Edition. Entirely rewritten. London: George Allen & Unwin, Ltd. Ruskin House, 40 Museum Street, W.C. [Price 24s. net.]

The study of vital statistics in its broadest sense is the daily occupation of all those who have an interest in the welfare of their fellow creatures. It is only when the subject is treated in a systematic and scientific manner, involving tables of figures which are difficult to interpret, and curves which may be hard to understand, that the ordinary individual shrinks from it. The fault may lie in the method of presentation, or it may be due to the terrifying amount of material which has to be dealt with. The science, however, is clear in itself, and it should be the endeavour at any rate of every medical man to master it. The conception of time as a flowing stream, into which lives are born, which, after a brief passage, are again cast out of the current, is one which has appealed to man throughout the ages. It appears in the earliest literature, it finds a place in the most modern philosophy. It is more than an analogy, it is a mode of thought.

The problem may be approached in a general manner, on what one may call hydro-dynamical lines, that is to say one may study the general behaviour of the stream as it flows. On the other hand, it may be attacked in a detailed, or, let us say, a geographical manner, when one devotes one's attention to those influences which affect the stream or are affected by it. The general or hydro-dynamical study requires a considerable degree of mathematical knowledge, and is usually left to the actuarian. The detailed or geographical study, in this country at least, is usually confined to Health Officers, and biometricians. It is unfortunate that this is so—for the study of the health and welfare of people should be the special province of those who by their medical education are peculiarly suited for it. In this respect the medical man of the tropics is far in advance of his brother at home.

The general point of view of the actuarian should not be neglected. His problems bristle with interest. He deals with the chances of death at the various ages, that is to say with the variations in number of individuals, born at the same time, and living under constant conditions of environment, during their course down the stream. He deals with the age proportions; that is to say with the relative numbers at each age which pass some specified point on the bank of the stream. He examines these in populations under constant conditions of environment, and contrasts them in different races. He enlarges his study to observe and interpret the further variations which take place as external conditions vary. He may even find evidences of whirlpools or vortices in the stream, as, for example, when he investigates the correlation between health and wealth.

On the other hand, and even more so, we cannot afford to neglect the detailed or geographical study which deals with the reality and significance of less general variations. We should have exact information regarding the relative importance of different diseases. We should know whether they are on the increase or decrease. We should know whether particular occupations, or conditions of environment, have a significant influence on particular diseases, and in what manner and degree they influence them. Our distant objective is the amelioration of adverse conditions, but we must first convince ourselves with scientific accuracy that they are in truth adverse. We must know, further, that their removal is likely to result in a significant improvement, and that the cost of their removal is justified.

Take, for example, such questions as the effect of overcrowding; its influence on general health; upon the rate of transmission of communicable diseases. Or again, the effects of alcohol consumption upon a population: as it affects general health, susceptibility to disease, the prevalence of venereal disease, of accident, suicide and homicide; its influence upon the birth-rate, legitimate and illegitimate; its relation to overcrowding and poverty.

Sir Arthur Newsholme, in his Elements of Vital Statistics, deals with questions such as these, and in his new edition has furnished us with the ripe fruit of many years of experience and study. Apart from the last hundred pages, which relate to methods, the book contains no mathematics. This will be a regret to some, and a relief to others. With a severity of scientific restraint, which will commend itself to all, he discusses the basal facts out of which arise the social problems, not only of our own, but of all nations. His chapter on alcoholism in relation to the public health is a restrained and reasoned analysis of facts, which lead inexorably to a conclusive verdict. The same may be said with regard to his chapter on Housing statistics. This useful volume should be the *vade mecum* of all who are interested in problems of health as they relate to people in the mass. It should be read by every social reformer, be he layman or medical. It will be of special value to those who are responsible for the virgin populations of tropical countries.

A. G. McKendrick.

INDIA. **Census of India. 1921. Vol. 1. Part 1.—Report.** [MARTEN (J. T.), M.A., I.C.S.]—pp. xii+293+xxvi. With numerous maps and charts. 1924. Calcutta: Supt., Govt. Printing. [Price Rs. 4 As. 12, or 6*s.* 4*d.*]

—— **Part II.—Tables.** pp. ii+351. 1923. Calcutta. [Price Rs. 9 As. 4, or 12*s.* 4*d.*]

The territory included in this census lies between long. 61° to 101°E. and lat. 8° to 37°N., and comprehends Baluchistan and Burma, besides India proper and the native Indian States. The few appropriate items here selected from the Report of the census relate exclusively to British India, which does not include the native Indian States.

The area of British India is 1,094,300 square miles; its population numbers 247,003,293, the average density of the population per square mile varying from over 1,000 in certain parts of Eastern Bengal to 6 or 7 in Baluchistan.

Vital statistics, to which our concern is restricted, are recorded in all but the rudest and remotest tracts. The raw material is collected in rural areas by the village headman, who communicates it to the nearest police station, where it is registered; in towns the registration is done under municipal authority. Statistics so based cannot have a very high value, even were all village headmen and municipal clerks as handsome in all their doings as Dogberry, and as honest as Verges. The village headman may perhaps recognize plague and cholera and smallpox during established epidemics, but pretty well everything else is "fever." Even in records of birth and deaths, omissions are believed to range up to 20 per cent. in rural areas, and even higher still in municipalities. But though the statistics have little absolute value they are collected under the same conditions from year to year, and maintain the same calibre for domestic comparison.

The total death-rate for British India is between 30 and 31 per mille; and the infantile death-rate amounts to about one-fifth of it. In the present decade the infantile mortality per thousand children born alive averaged—excluding the year of the influenza epidemic—211 males and

199 females, and in the year of that epidemic was 274 males and 260 females. Over 40 per cent. of the deaths of infants occur in the first week and over 60 per cent. in the first month after birth.

During this decade the calamity that exercised the most disastrous effect upon the public health was the influenza epidemic of 1918–19. Apart from indirect and remote effects, the recorded mortality from the disease was 8½ millions, which unfortunately can only be regarded "as a substantial underestimate" of the total. What the mortality really was can never be known, but it is here stated that in a few months the epidemic blotted out the whole amount of the natural increase in population for the previous seven years.

The number of deaths from plague was less than half that of the previous decade (when the recorded deaths numbered 6½ millions).

As usual, by far the largest number of deaths are recorded as "Fever." Formerly about two-thirds of these deaths were assumed to be due to malarial fevers; but although in the present decade epidemic malaria has been specially severe in the Punjab and United Provinces, and although the population in certain parts of Lower Bengal is said to be sodden with malaria, not more than one-fifth to one-fourth of the "fever" deaths are now attributed to the malaria parasite. In the last few years Relapsing Fever has been recognized as prevalent, especially in Northern India, the Central Provinces and Berar, and in Bombay, but its extent cannot at present be estimated. The same thing may be said of Phthisis, which is undoubtedly responsible for a considerable mortality, particularly in the towns of Western India.

The total death-rate from Cholera for the decade did not amount to more than 1·5 per cent. [? mille].

Of the census of "Infirmities" (which include insanity, deaf-mutism, total blindness, and leprosy) it is admitted that there are few headings in which trustworthy figures are more difficult to obtain. At the present census 33 per 100,000 males and 22 per 100,000 females were returned as insane, the largest number being in Burma and the fewest in Rajputana; but the criticism of an expert to whom the returns of the previous census were submitted is that they are incorrect and useless. The number of asylums is 23, and the total asylum population is 8,134 males and 2,023 females. (As regards deaf-mutism it is clearly stated that the returns are useless—that senile deafness has been included and that defective children have been ignored.)

The number of persons returned as totally blind is 152 in every 100,000 of population, the figure ranging from 319 in Baroda to 33 in Sikkim, being highest in hot arid sandy tracts.

The total number of lepers returned is 102,513, or 32 per 100,000 of population, the figure ranging from 74 in Burma to 4 in Rajputana. Dr. Muir, however, of the Calcutta School of Tropical Medicine, thinks that the number should be multiplied by 10, justifying his opinion by the facts (1) that of 60 menial servants of the School examined by him, 5 were suffering from leprosy quite unawares, and (2) that on the day after the census was taken he found that only 2 out of 30 lepers attending his out-patient department had had their names entered on the census papers as lepers. The number of leper asylums is 89, and of inmates 8,090.

A. Alcock.

League of Red Cross Societies. **Elements of Hygiene.**—Published with the Authorization of the Comité National de Défense contre la Tuberculose.—32 pp. Illustrated in four colours. Paris: 2, Avenue Velasquez.

The stated purpose of this little book is to put before the public some simple principles for the preservation of health and avoidance of disease, so that parents and teachers may duly impart them to the young. The matter includes maternity, infancy and childhood, with particular attention

to tuberculous infection in industrial life; the dangers of tuberculosis, alcohol, flies, and polluted wells; the sanitary duties of the general community, and the responsibilities of the department of public health; and it is graphically presented in the form of broadside and poster combined. There are 29 of these illustrated (*more gallico*) broadsides, each conveying its particular lesson, usually of warning, but sometimes of hope. The open window and the open-air school are well in evidence, and most horribly salutary should be the pictures of the miscreant who spits upon the floor where his baby is playing, of the yahoos who cough and sneeze into inhabited space, of the well receiving the ample subsoil drainage of the adjacent cowshed and privy, and of the fly with diabolical leer exuding pestilential bombs upon a terror-stricken crowd below. An educated layman who has been asked for his opinion considers that the book is full of very good advice very *frankly* presented.*

A. Alcock.

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* The pamphlet is available also in Spanish, French, Italian, Portuguese and Rumanian, and the League Secretariat is willing to re-issue it in any other language provided a minimum order for 5,000 copies is received.